JUNE, 1961

Series F

Burroughs
SERIES F 1000
TYPING SENSIMATIC
ACCOUNTING MACHINE

INSTRUCTION BOOK

Subject To Change Without Notice

INSTRUCTION

MECHANISMS AND ADJUSTMENTS

OPTIONAL FEATURES

SERVICING PROCEDURES

CORRECTION INDEX

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Detroit 32, Michigan

In Canada:

Burroughs Business Machines Ltd.

Toronto, Ontario

Printed in U. S. America—6-1-61

Form 3741

CONTENTS

INTRODUCTION

A general description of the typing sensimatic accounting machine and its features and an explanation of the operation of a Series F1000 machine on an accounts receivable application.

MECHANISMS AND ADJUSTMENTS - POWER, TYPEWRITER KEYBOARD, WRITER SECTION, AND CARRIAGE

A detailed description of the purpose, construction, operation, and adjustment of the basic mechanisms of Series F1000 machines. Tests and adjustments for a subject are provided immediately after the subject.

OPTIONAL FEATURES

A detailed description of the purpose, construction, operation, and adjustment of the various special and optional features used on the various Styles and Series of F1000 machines.

SERVICING PROCEDURES

A guide for performing various mechanical tasks required when servicing Series F1000 machines including preventive maintenance, removal and replacement procedures, tests, and adjustments.

CORRECTION INDEX

Information relative to correcting troublesome conditions encountered in servicing Series F1000 machines.

Burroughs

SERIES F 1000

TYPING SENSIMATIC ACCOUNTING MACHINE

INSTRUCTION BOOK

Section I

●

INTRODUCTION

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INTRODUCTION

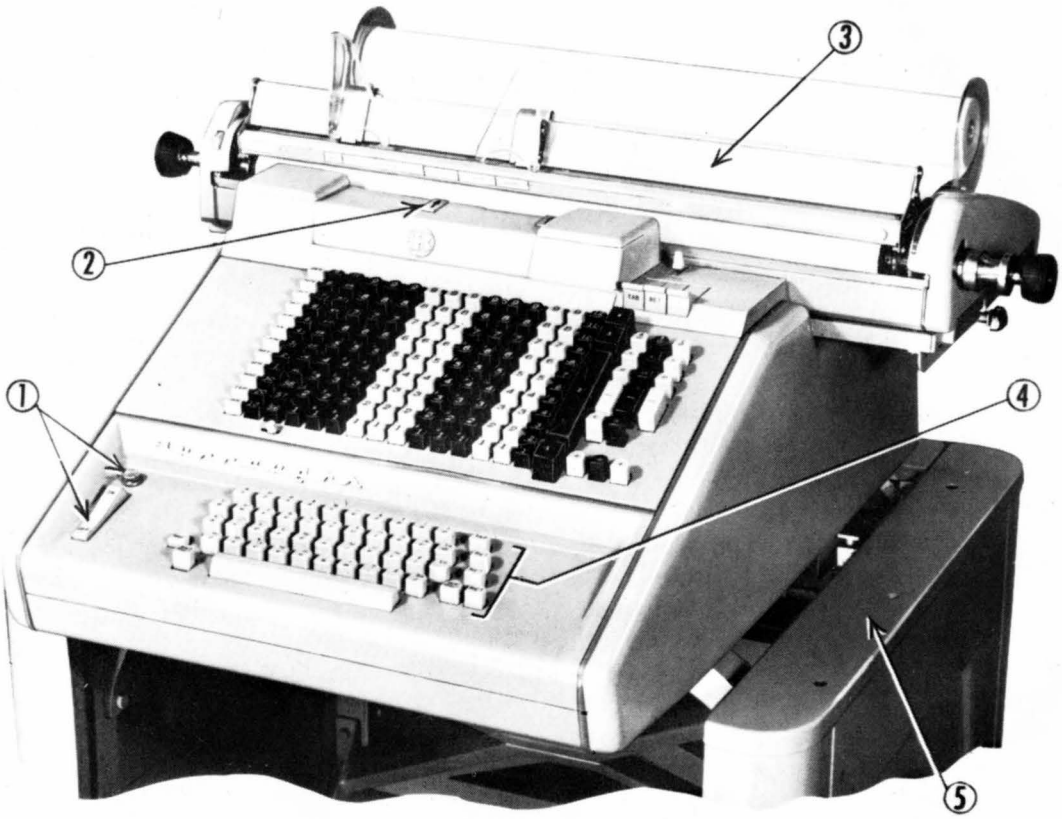

Fig. I-1

TYPING SENSIMATIC ACCOUNTING MACHINE

The Typing Sensimatic accounting machine provides the function of typing in the Series F line of bookkeeping equipment. Designated as Series F1000, this machine incorporates the basic functions of Series F50 through F500, new mechanisms for typing, and new concepts of machine power and carriage movement. Various styles within this series are designated by the last three digits of the style number, which refer to the style features of the basic Sensimatic series. The style F1502 machine, for example, incorporates the style features of F502 machines.

F1000 basic features, style features, and functional mechanisms discussed in this book are those which are different from or added to basic Sensimatic features. Study of this series is dependent upon understanding of the basic Series F machine function.

BASIC FEATURES

1. The main switch, conveniently located at the left of the typewriter keyboard, starts and stops the motor and also controls the electrical circuits from the wall plug to all electrical components. The indicator lamp, near the main switch, visually notifies the operator when power is "ON". Constant power, mechanical and electrical, is necessary for typing and instant carriage movement.

2. Printing is performed by the writer section which is located near the Sensimatic printing section. The printing position is 4.1 inches to the left of the carriage stop position which is the basic reference for form alignment. The type box which contains 84 single type is moved horizontally and vertically to align the selected type with the printing hammer. Any of the 42 type may be printed with the shift key normal and the other 42 type are selected with the shift key indexed to provide un-

limited description of posting entries. The typed description is spaced 10 characters to the inch while the Sensimatic printing remains unchanged with spacing of 8 digits to one inch of platen length.

3. The 22" front feed carriage is standard construction on most styles. It is nearly identical to the basic Sensimatic carriage but is deeper to accommodate the larger program unit and is painted Beige 125 to match the rest of the machine. The program unit has, in addition to 25 Sensimatic control lanes, a typewriter disk shaft which controls carriage movements in lanes 26 through 30. These movements are indexed from the typewriter keyboard.

4. The electric typewriter keyboard is conveniently located and features easy key depression. Only slight pressure on the "finger tip" keytops is required to depress any key - either to perform typing or index associated carriage movement. The 42 character keys are arranged in a standard pattern, consisting of 4 rows with the space bar directly in front. At the left of the character keys is the shift key and the back space key. These keys perform functions normally required on a correspondence typewriter. Immediately to the right of the character keys is the form space key which permits spacing the forms vertically without a machine operation. Near the right end of the keyboard are four carriage control keys. Depression of the proper key after typing the posting description, returns or tabulates the carriage for additional typing or to the pre-selected position for numerical posting. Form spacing may be added to the function of these keys when so required by the machine application.

5. The Style 95 stand is designed specifically to accommodate the Typing Sensimatic. The rear mounts for the machine permit pivoting the machine to a vertical position where the accumulators are readily accessable through cutouts in the redesigned machine base. The rear panel of this desk type stand mounts the electrical power pack unit and is hinged to swing outward for servicing convenience. A raising and lowering device and an interchangeable check shelf (right or left) are standard construction.

6. The machine case panels provide for quick access to machine mechanisms. Use of 1/4 turn fasteners permits removal of all panels in about two minutes.

APPLICATION AND OPERATION

To understand the mechanical functions of the Typing Sensimatic, the serviceman should be familiar with its application and operation. Demonstrating material for standard demonstrating units, which is available in the Branch's "Advertising and Reference" file, may be used for this phase of study. The sample application of accounts receivable in Figure I-2, with the accompanying instructions illustrates the flexibility and ease of operation.

Moving the main switch on the typewriter keyboard to "On" position will close the principal electrical circuits in the machine and will start the motor. The indicator light will glow when the machine is operable.

Insert the journal sheet around the platen, clear the Sensimatic in the proper manner; insert the ledger sheet in the carriage and proceed with the posting according to the following outline.

LINE 1 - Single Debit Entry
Index "Old Balance" $375.00
Depress M.B. No. 2
Machine will print the balance, tabulate carriage to the date position, print the posting date and tabulate carriage to typing position. (Typing stop is located 4.1" to the right of the typing position. In this application a common stop is used in the "Charge" column.)

Type "Description" COAT
Depress Key No. 3
Carriage will return to "Charge" column.

Index amount $123.45
Depress M.B. No. 2
Machine will print the charge, tabulate carriage to the balance column, print and return carriage to the O.B. position.

LINE 2 - Single Credit Entry
Index "Old Balance" $498.45
Depress M.B. No. 2
Machine will print the balance, tabulate carriage to the date position, print and tabulate carriage to the typing stop.

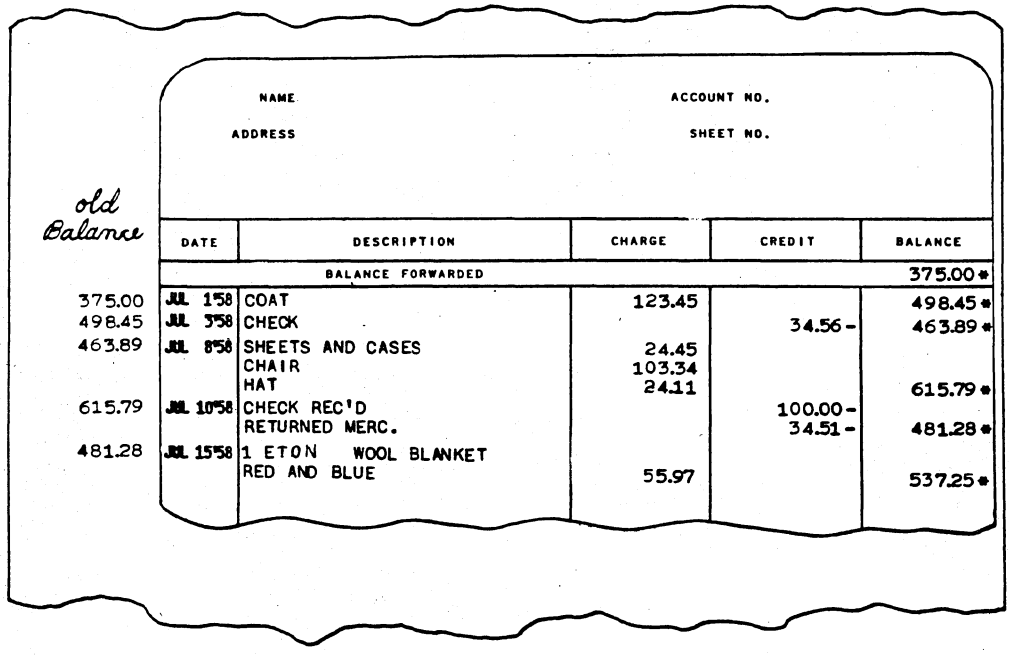

Fig. I-2

Type "Description" CHECK
Depress Key No. 4
Carriage will tabulate to "Credit" column.

Index amount $34.56
Depress M.B. No. 2
Machine will print the credit, tabulate carriage to balance position, print and return carriage to O.B. position.

LINE 3 - Multiple Debit Entry
Index "Old Balance" $463.89
Depress M.B. No. 2
Machine will print the balance, tabulate carriage to the date position, print and tabulate carriage to the typing position.

Type "Description" SHEETS AND CASES
Depress Key No. 3
Carriage will return to "Charge" column

Index amount $24.45
Depress M.B. No. 3
Machine will print the charge and vertically space the form.

Type "Description" CHAIR
Depress Key No. 3
Carriage will return to "Charge" column

Index amount $103.34
Depress M.B. No. 3
Machine will print the charge and vertically space the forms.

Type "Description" HAT
Depress Key No. 3
Carriage will return to "Charge" column

Index amount $24.11
Depress M.B. No. 2
Machine will print the charge, tabulate carriage to the balance column, print and return carriage to O.B. position.

LINE 4 - Multiple Credit Entry
Index "Old Balance" $615.79
Depress M.B. No. 2
Machine will print the balance, tabulate carriage to the date position, print and tabulate carriage to the typing position.

Type "Description" CHECK REC'D
Depress Key No. 4
Carriage will tabulate to "Credit" column

Index amount $100.00
Depress M.B. No. 1
Machine will print the credit, vertically space the forms and return to the typing position.

Type "Description" RETURNED MERC..
Depress Key No. 4
Carriage will return to the credit column.

Index amount $34.51
Depress M.B. No. 2
Machine will print the credit, tabulate carriage to balance column, print and return carriage to O.B. position.

LINE 5 - Single Debit Entry Requiring Two Lines of Typing

Index "Old Balance" $481.28
Depress M.B. No. 2
Machine will print the balance, tabulate carriage to the date position, print and tabulate carriage to the typing position.

Type "Description" 1 ETON WOOL BLANKET
Depress Key No. 2
Carriage will vertically space forms and return to the typing position.

Type "Description" RED AND BLUE
Depress Key No. 3
Carriage will return to the charge column.

Index amount $55.97
Depress M.B. No. 2
Machine will print the charge, tabulate carriage to the balance position, print and return carriage to O.B. position.

Burroughs

SERIES F 1000

TYPING SENSIMATIC ACCOUNTING MACHINE

INSTRUCTION BOOK

Section II

●

MECHANISMS AND ADJUSTMENTS

Printed in U. S. America—6-1-61

For Form 3741

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MECHANISMS AND ADJUSTMENTS

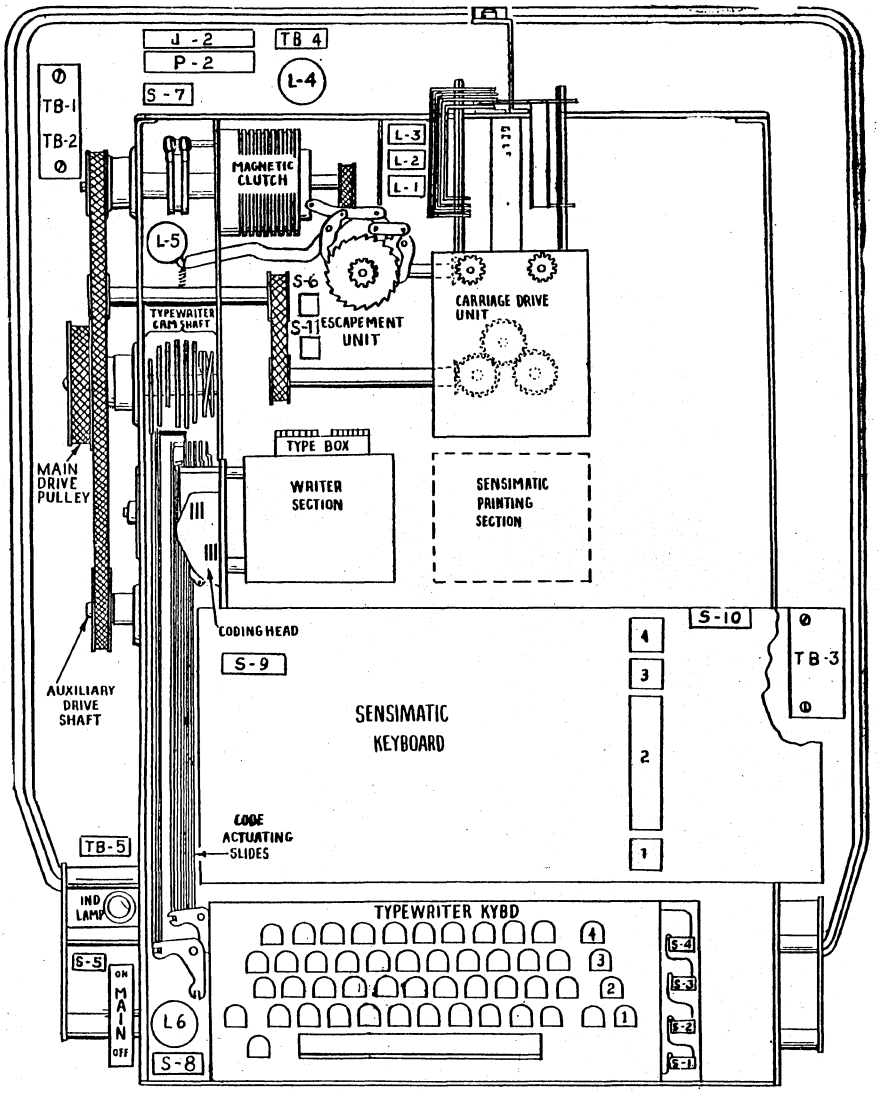


Fig. II-1

The Typing Sensimatic Accounting Machine is basically a Sensimatic machine with some sections redesigned and new mechanisms added to provide the means of typing word and sentence description. Described herein is the purpose, construction and function (including Tests and Adjustments) of mechanisms providing power, typing, carriage movement and others -- pertinent to Series F1000 machine construction. Thorough functional knowledge of Series F50 through F500 mechanisms and practical understanding of electrical principles are necessary background information for study of this equipment.

General headings of Power-Electrical, Power-Mechanical, Typewriter Keyboard, Writer Section, Carriage Movement and Miscellaneous Modifications are used to group functional study. Figure II-1 shows the relative location of machine components.

POWER-ELECTRICAL

Electrical circuits in Series F1000 machines provide control of instantaneous power used to run the motor and to transfer manual or mechanical indexing from one section into mechanical movement in another remote section and therefore eliminates need for complicated mechanical linkage normally required. Both alternating and direct current are used. Standard construction is based on 115 Volt A. C. power source, but provisions for other A. C. voltages and for D. C. power will be discussed as "Special Power Requirements".

Alternating current from the wall plug runs the motor, illuminates the indicator lamp and provides power to the rectifier. The motor provides mechanical power, the indicator lamp provides visual indication that the current is on, and the rectifier converts alternating current to direct current.

The main switch (S-5) is actuated by the operator to start and stop the motor. This is a single pole throw leaf type switch located at the left of the typewriter keyboard. Moving the switch to "ON" position closes the circuit to the motor, the indicator lamp, and the rectifier. The rectifier then supplies direct current to the magnetic clutch for carriage movement.

The induction type motor, rated at 1/12 H. P., operates on 115 volts, 60 cycle alternating current. 1 3/4 amperes of current are required for starting but only 1 amp is required for continuous running. Since the induction motor is not self-starting, it contains a start winding in addition to the running windings to give the rotor direction and start its rotation.

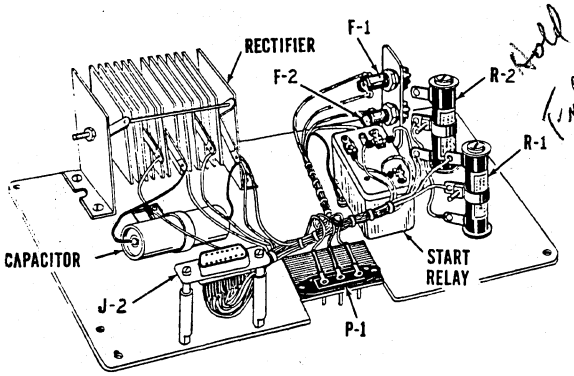


Fig. II-2

The power pack is a grouping of electrical components for convenience of construction and service. The power pack on machines beginning with serial number F110353P contains a motor start relay, two variable resistors, two fuses and a printed circuit board assembly. Power packs on earlier style machines contain a motor start relay, a selenium rectifier, a capacitor, two variable resistors and two fuses.

The motor start relay automatically closes and opens the circuit to the motor start winding. When the main switch is moved to "ON" position, closing the circuit to the motor, a high flow of current goes through the running windings and the start relay coil. This high flow of current energizes the relay sufficiently to close the circuit to the start winding. The relay contacts remain closed momentarily while the rotor starts and accelerates. As the speed increases, induced current from the rotor opposes line current. When the rotor is turning at its proper speed, the low current flow through the relay coil permits the relay contacts to open the circuit of the start winding. Motor speed is then constant since it is controlled by current alternations - 60 cycles.

Fuse No. 1 (F-1), rated at 3. 2 amps., protects the entire electrical system, but principally the motor circuit, against excessive current flow resulting from an overload of the machine or a short circuit. This is a "slow-blow" type of fuse which permits a momentary overload but melts, opening the circuit, if the overload continues.

Fuse No. 2 (F-2), rated at . 75 amps., protects the rectifier and the D. C. circuits against damage which would result from excessive current input or a permanent short circuit within the D. C. components.

The printed circuit board assembly contains a bridge type rectifier utilizing four silicon diodes CR1, CR2, CR3 and CR4, Fig. 5, furnishing an average of 125 volts under load and providing the necessary D. C. power.

The current limiting R3 resistor prevents overloading of the diodes during initial charging of the capacitor.

The filter capacitor in the DC circuit helps to hold the voltage constant by discharging into the circuit when the voltage begins to drop.

The bleeder resistor R4 maintains good voltage regulation by furnishing constant load, preventing the filter capacitor C from charging to the peak

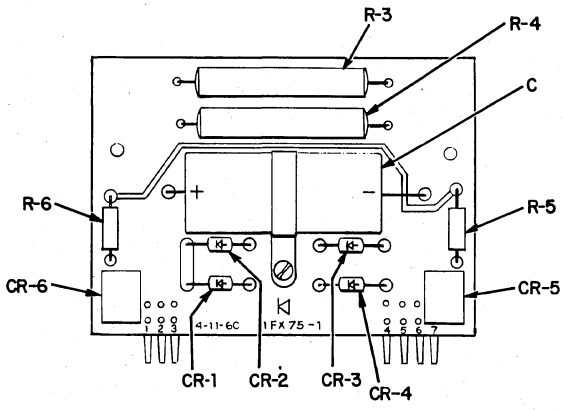


Fig. II-3

voltage of the rectifier. The bleeder resistor also is used to discharge the filter capacitor as a protective measure if the main switch is turned off.

Resistor R5 combined with diode CR5 and resistor R6 combined with diode CR6 are used as arc suppressors for the back space switch (S-6) and the drive trip switch (S-8) respectively.

The selenium rectifier and filter capacitor used in power packs of early style machines instead of the printed circuit board assembly have the same function as similar components on the printed circuit board assembly.

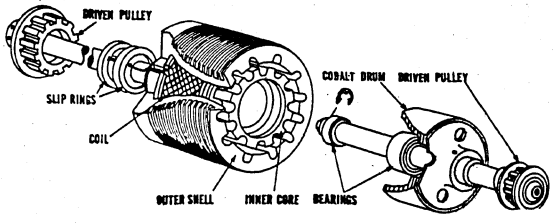


Fig. II-4

The magnetic clutch, in principle, is a rotating electro-magnet. Driven through gear belts from the constantly running motor, it applies frictionless, positive, continuous power necessary for varied carriage movements. The clutch unit consists of an inner core and outer shell, both permanently attached to the pulley drive shaft. The inner core is wound with a coil of wire, the ends of which are attached to slip rings on the drive shaft. Current through the coil creates a magnetic field between the staggered pole faces of the inner core and the outer shell. Through this area the cobalt drum is locked magnetically, thereby applying torque at the driven pulley to move the carriage for escapement, tabulation and return.

Resistors R-1 and R-2 control current flow through the coil of the magnetic clutch and the resultant mechanical power. When the main switch (S-5) is "ON", the high resistance of R-1 and part of R-2 permits a low current flow known as "Hold Power". This keeps the clutch warm for instant movement and provides sufficient torque to hold the carriage in the tab direction. The movable band on resistor R-1 provides the means of adjusting "Full Power".

Drive trip solenoid (L-6) controls trip of the typewriter camshaft spring clutch. Drive trip switch (S-8), actuated by depression of typewriter keys, closes and opens this circuit. The drive trip solenoid can also be activated through the closing of the back space switch (S-6). Additional control of drive trip is provided by shift key switch (S-9), Sensimatic switch (S-10), and tab interlock switch (S-11).

Carriage movement solenoid (L-5) is controlled by back space switch (S-6) and by carriage movement switch (S-1). Tabulation and return solenoids (L-1), (L-2), (L-3) and (L-4) which are controlled by keyboard switches (S-2), (S-3), and (S-4) provide the means of indexing selective carriage movement in lanes 27, 28, 29 or 30. Tab interlock switch (S-11) is connected in such a manner that it will inactivate tabulation and return solenoids (L-1), (L-2), (L-3), (L-4) thereby preventing switches (S-2), (S-3) and (S-4) from arcing.

Logic Diagram
for machines prior to F110353P

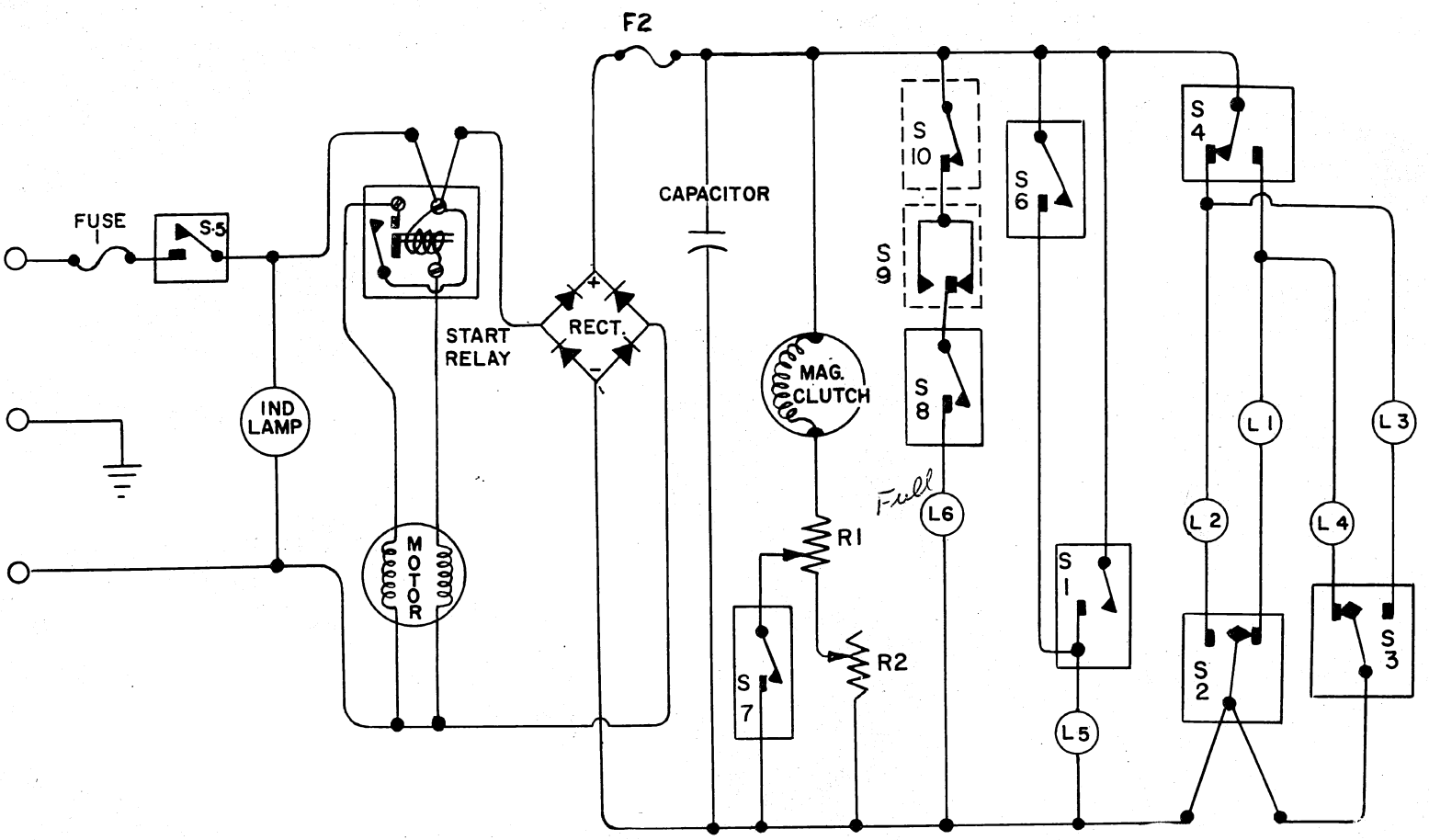


Fig. II-5

Logic Diagram
for machines beginning with F110353P

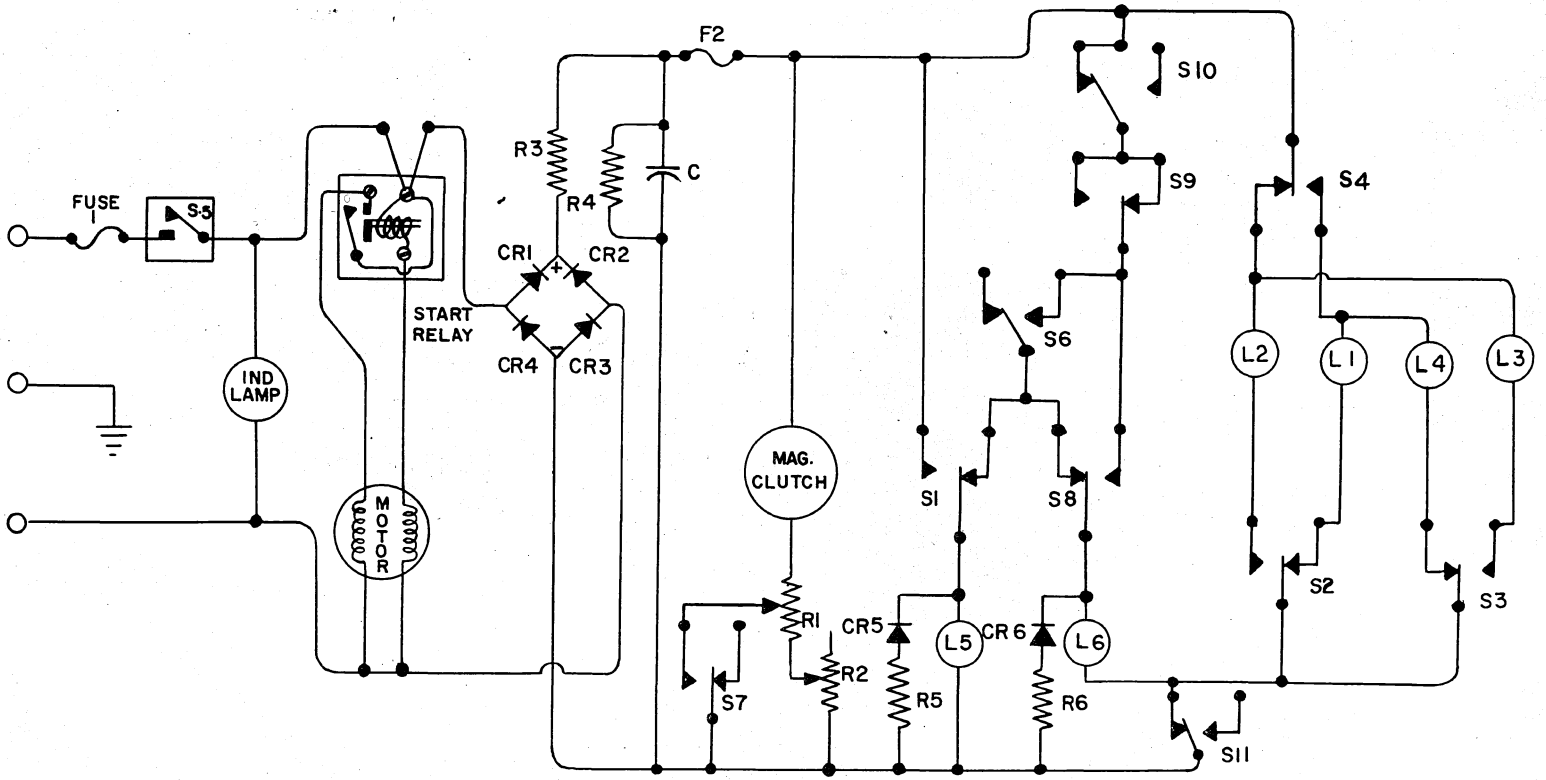


Fig. II-6

WIRING DIAGRAM

F1000 Prior to F77380P

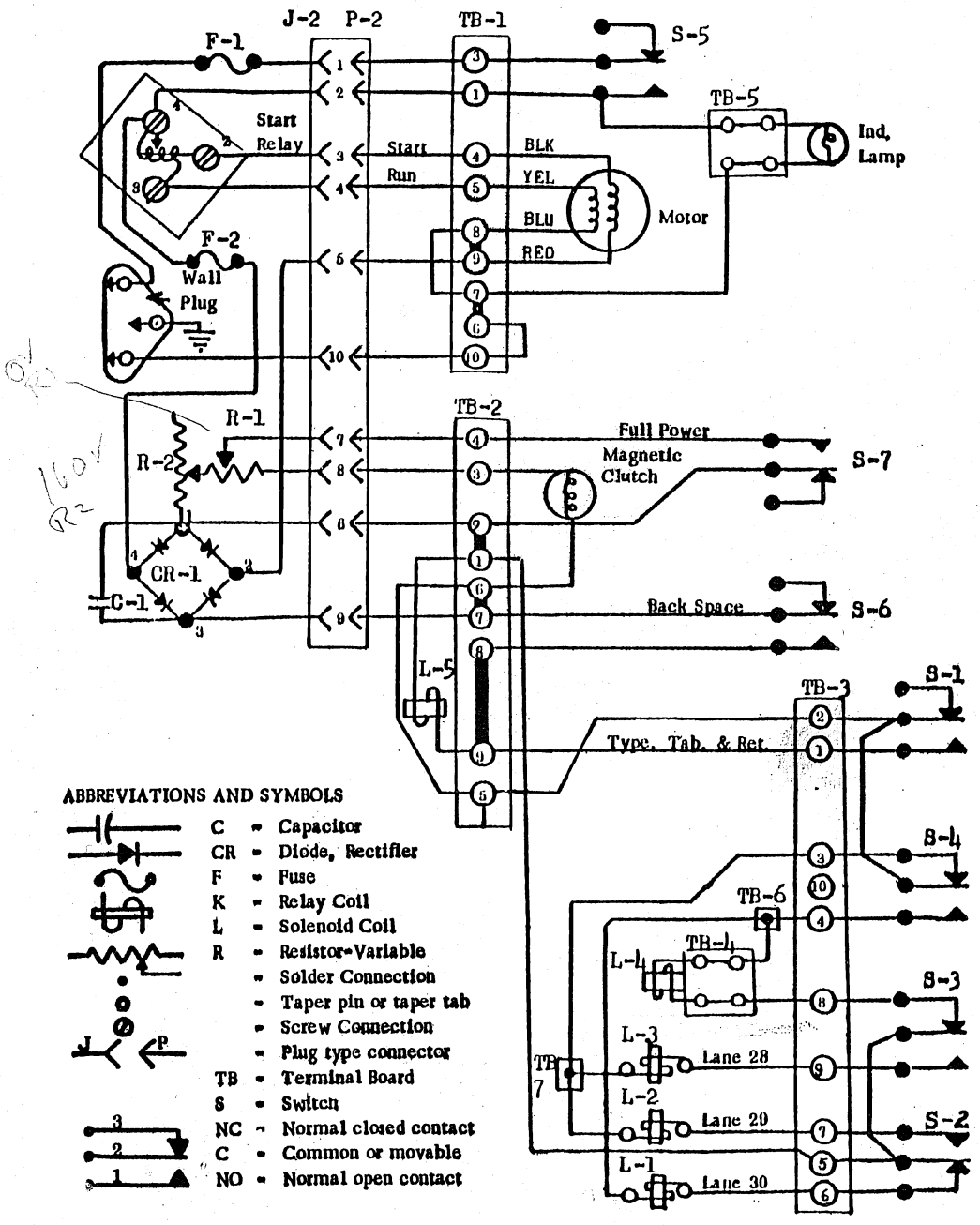


Fig. II-7

WIRING DIAGRAM
F1000 Machines F77380 to F81632P

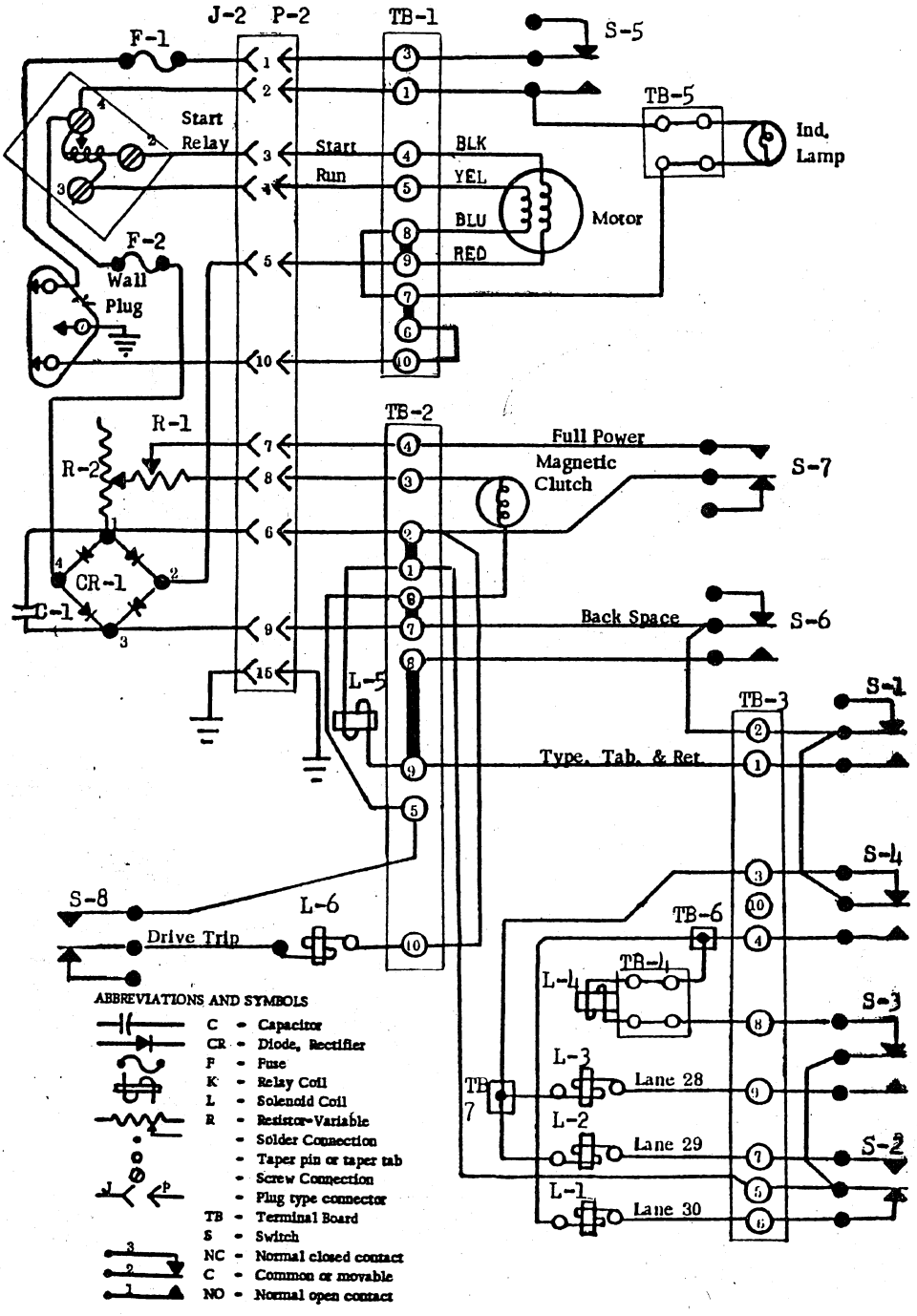


Fig. II-8

WIRING DIAGRAM
F 1000 F81632P to F89603P

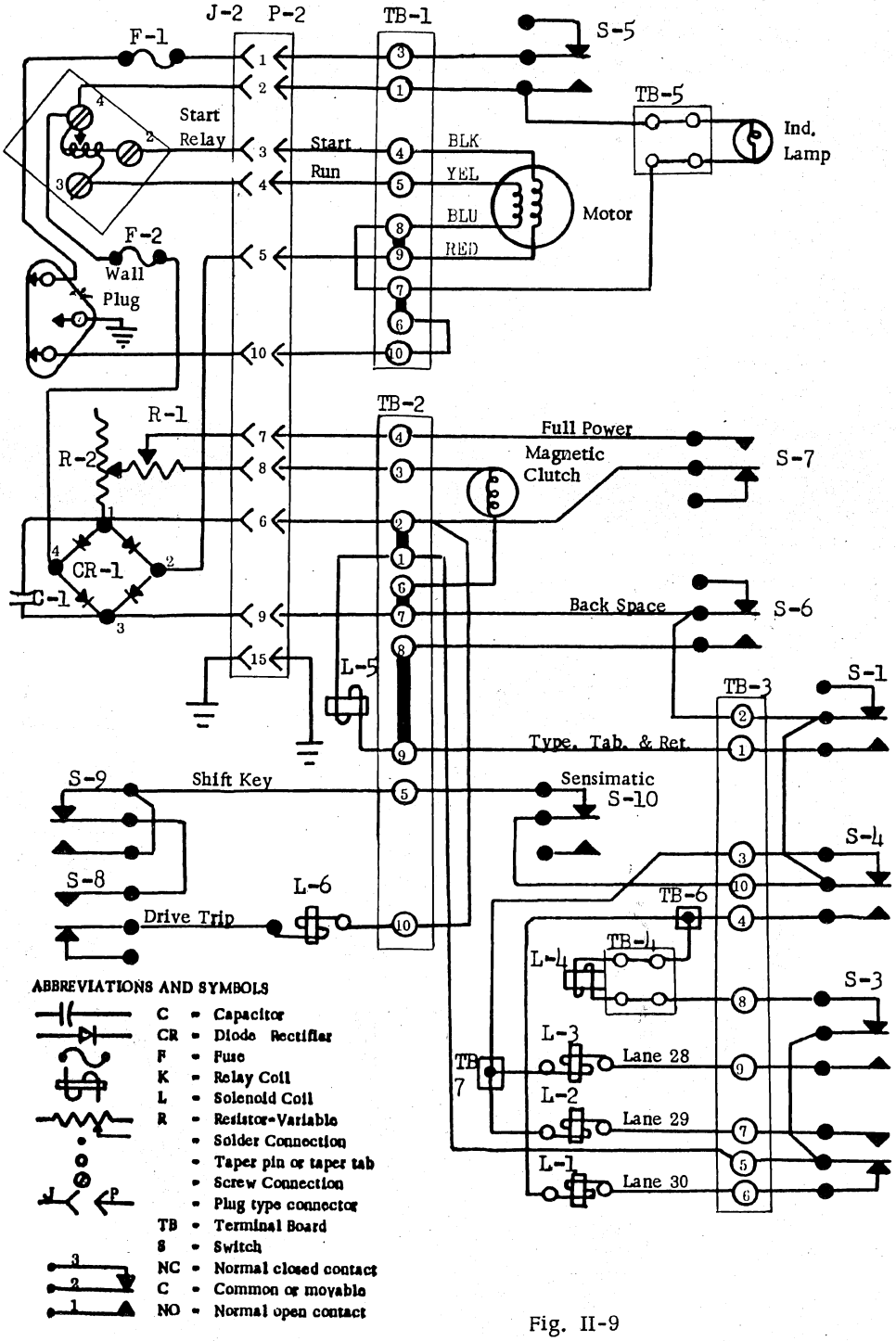


Fig. II-9

WIRING DIAGRAM
F 1000 F89604P to F99209P

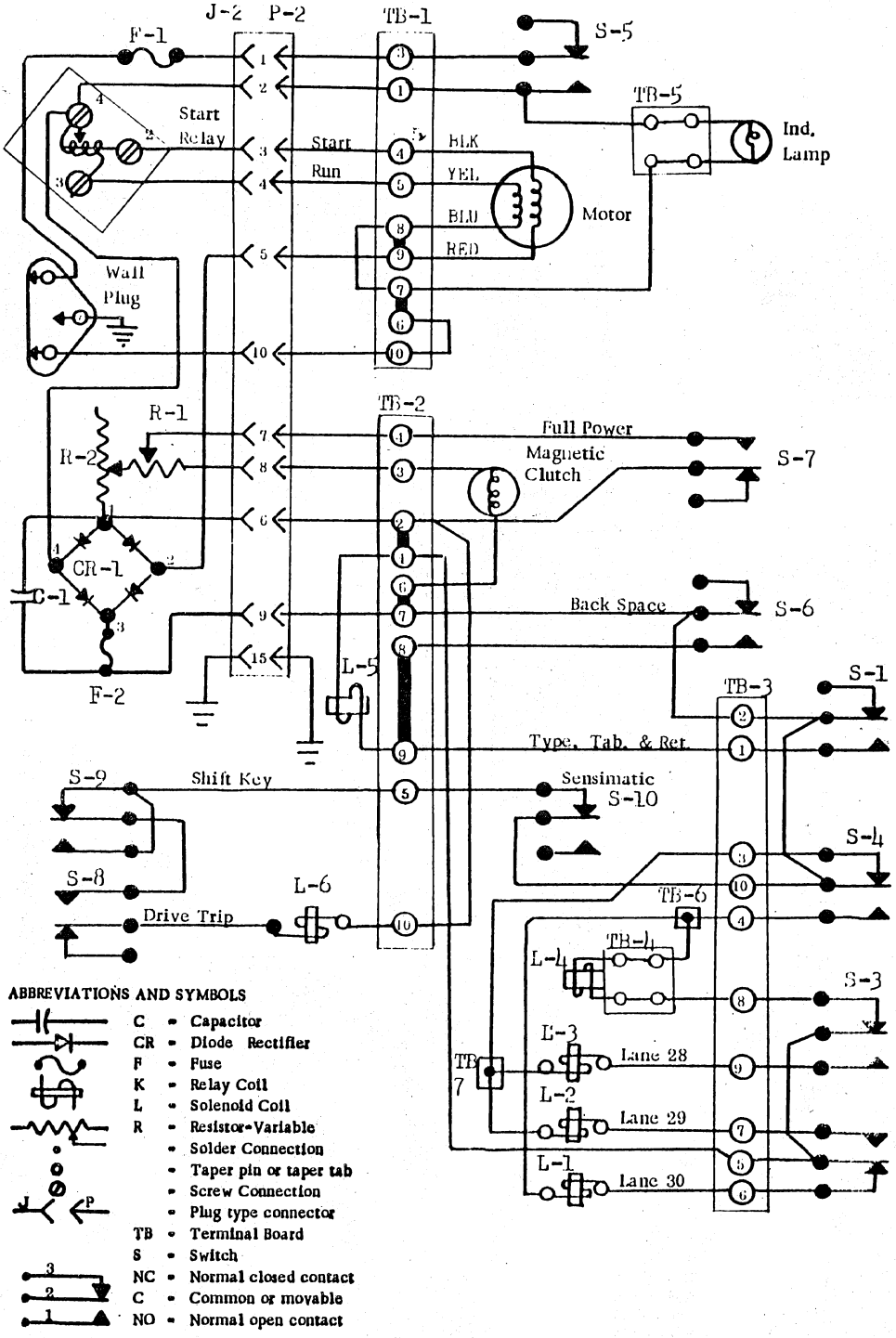


Fig. II-10

WIRING DIAGRAM
F 1000 F99210P to F110353P

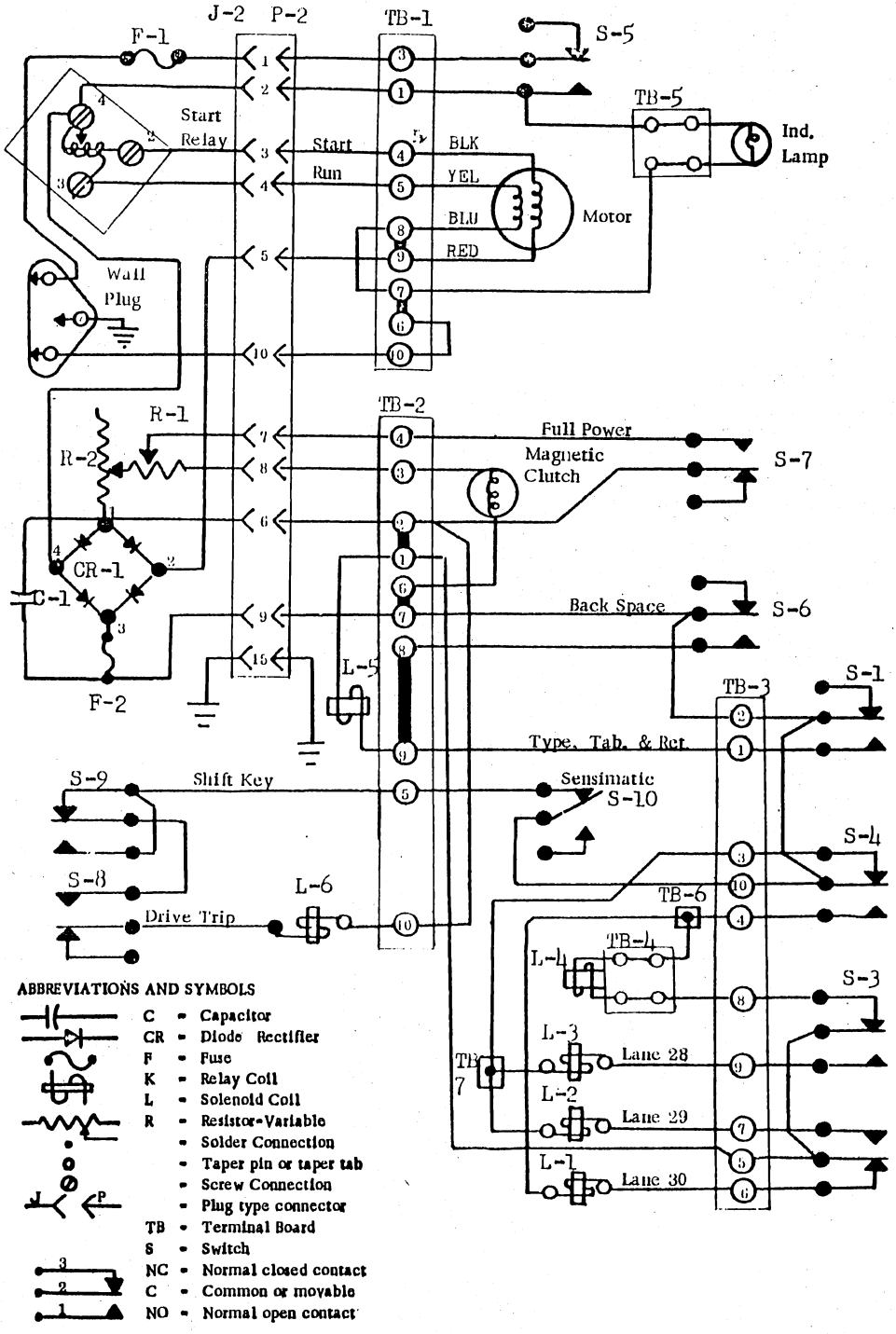
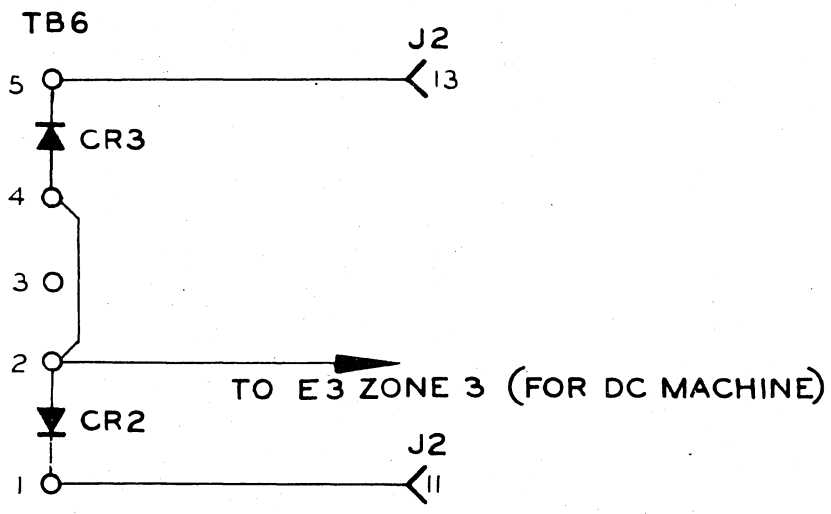
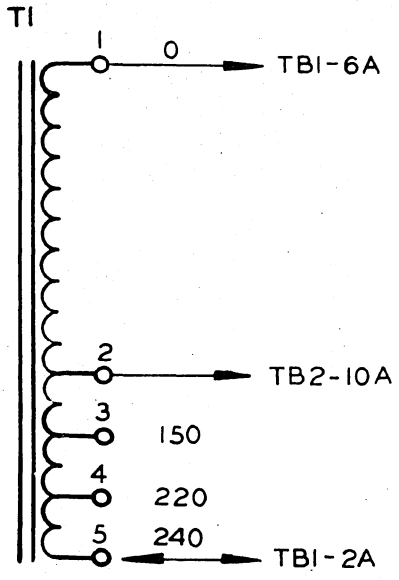


Fig. II-11

WIRING SCHEMATIC -F1000 MACHINES AFTER F110353P

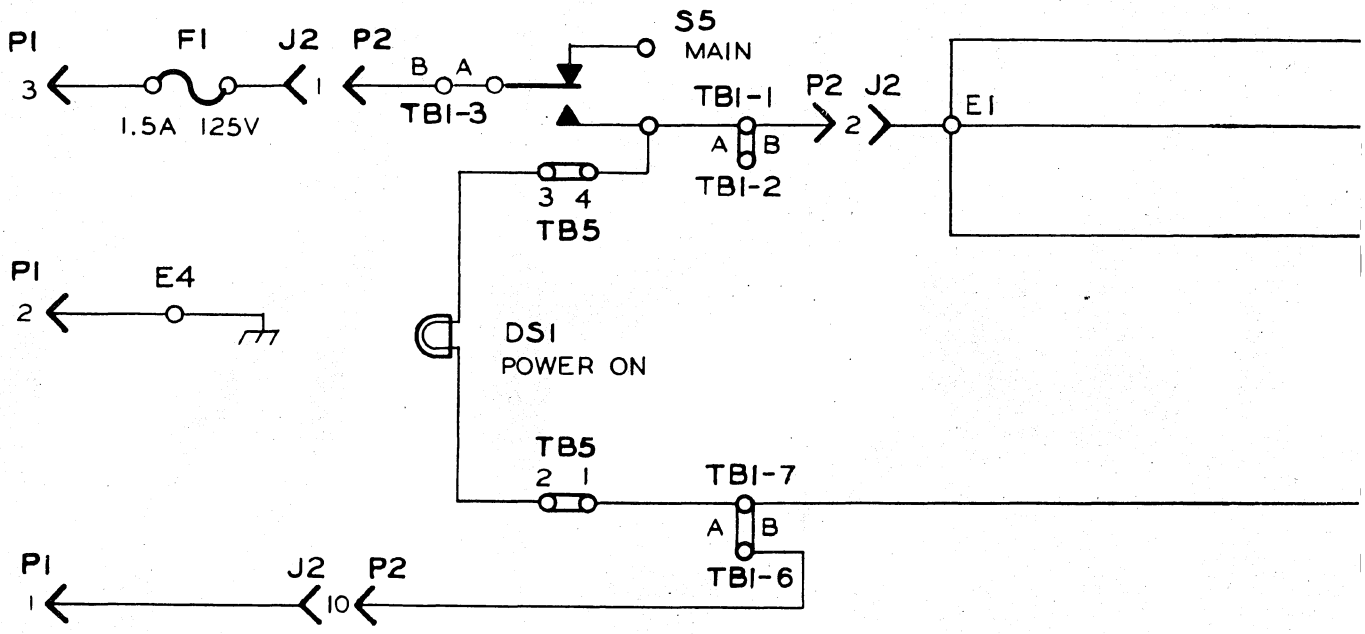


TRANSFORMER FOR USE WITH LINE VOLTAGES OF 150, 220, OR 240V.A.C.



CONNECT FOR LINE VOLTAGE IN USE

Fig. II-12


P1
3
F1
1.5A 125V
J2
1
P2
B
A
TB1-3
S5
MAIN
TB1-1
P2
J2
2
E1
A
B
TB1-2
3 4
TB5
P1
2
E4
DS1
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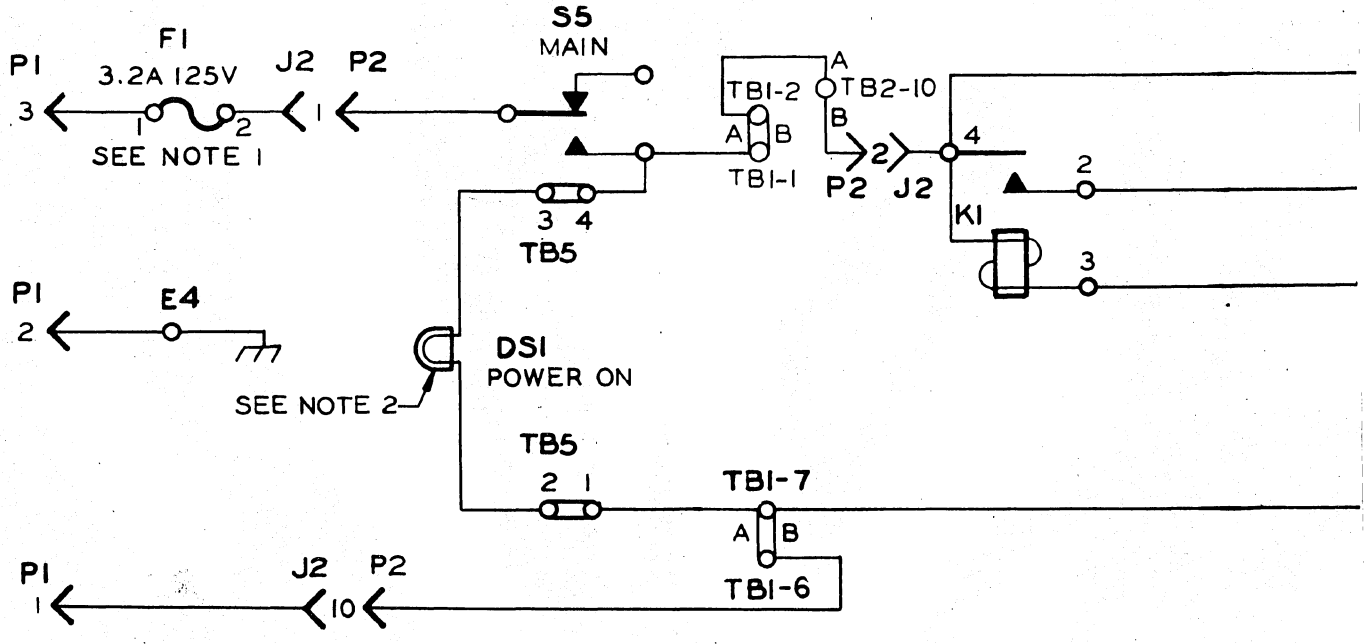
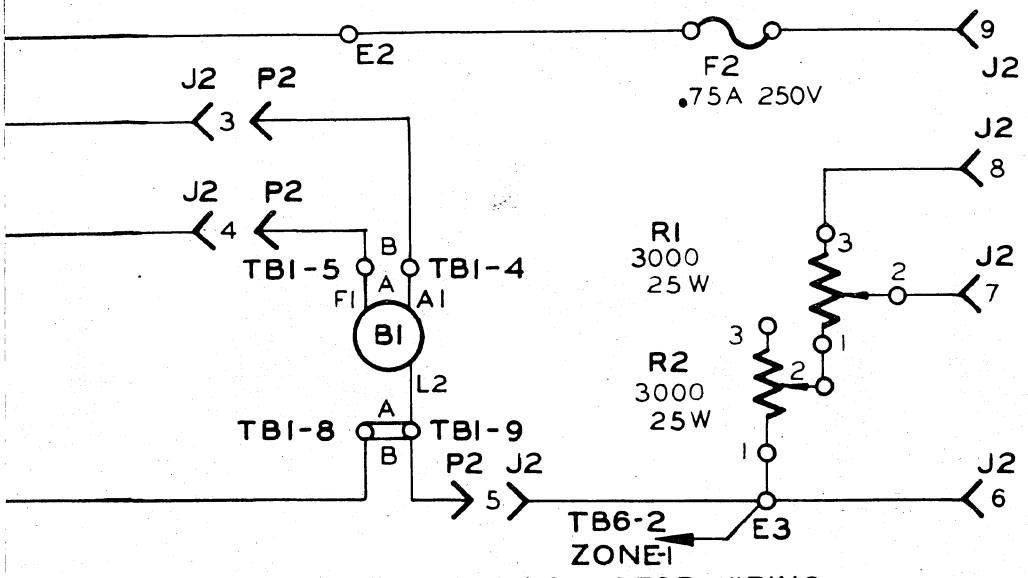
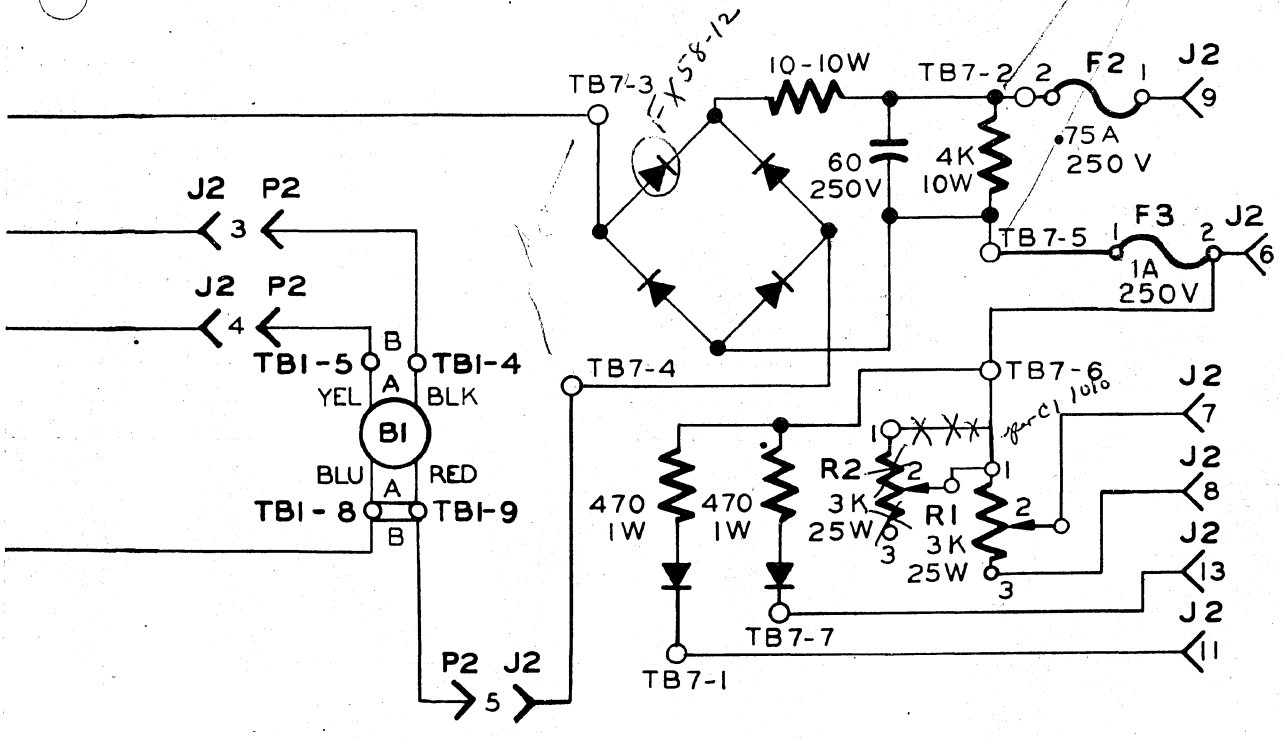
TB1-7
A
B
TB1-6
P1
1
J2
P2
10

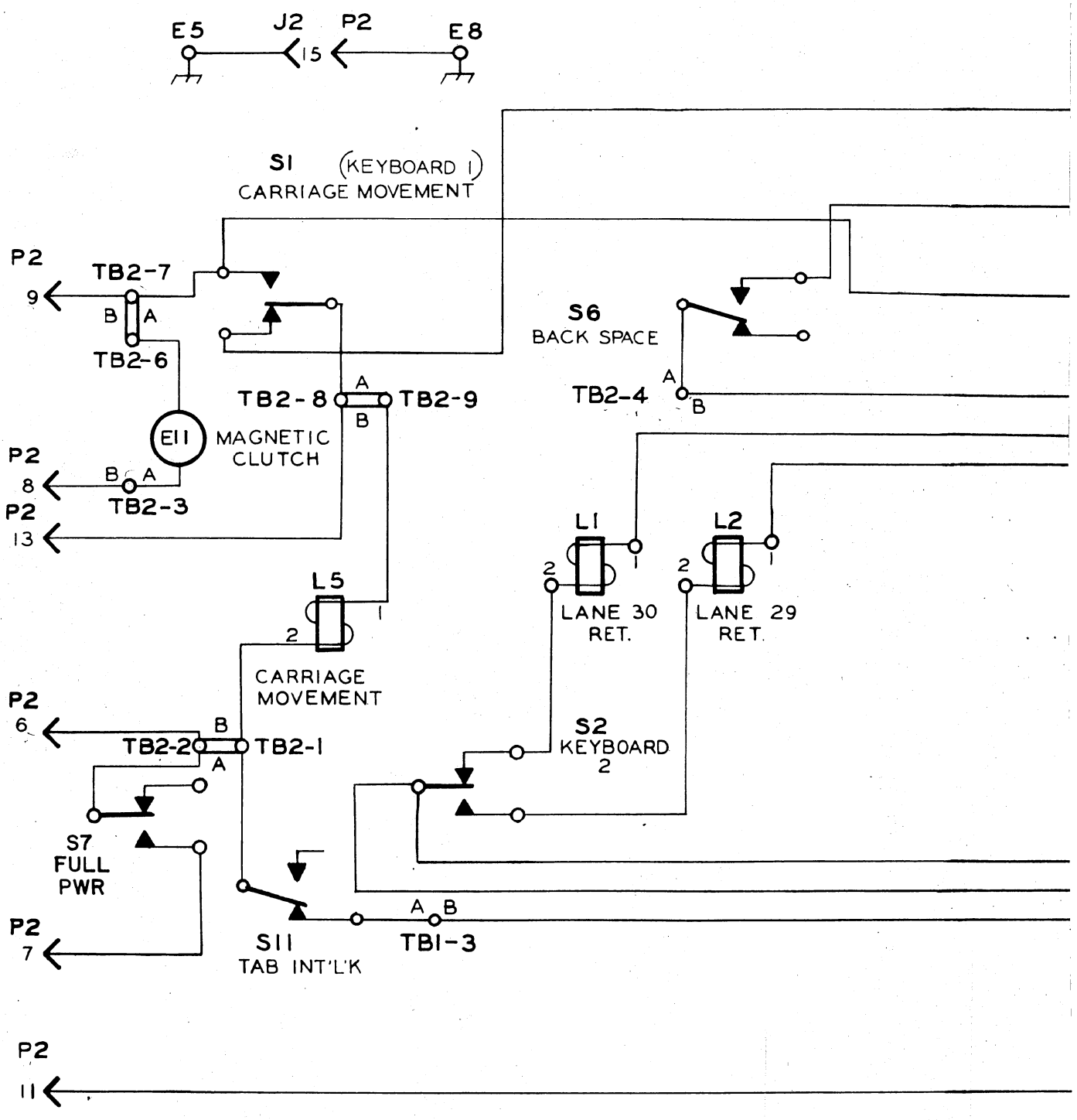

F1
3.2A 125V
P1
3
1
2
SEE NOTE 1
J2
P2
1
S5
MAIN
TB1-2
A
TB2-10
B
A
B
TB1-1
2
P2
J2
4
2
K1
3
3 4
TB5
P1
2
E4
SEE NOTE 2
DS1
POWER ON
TB5
2 1
TB1-7
A
B
TB1-6
P1
1
J2
P2
10

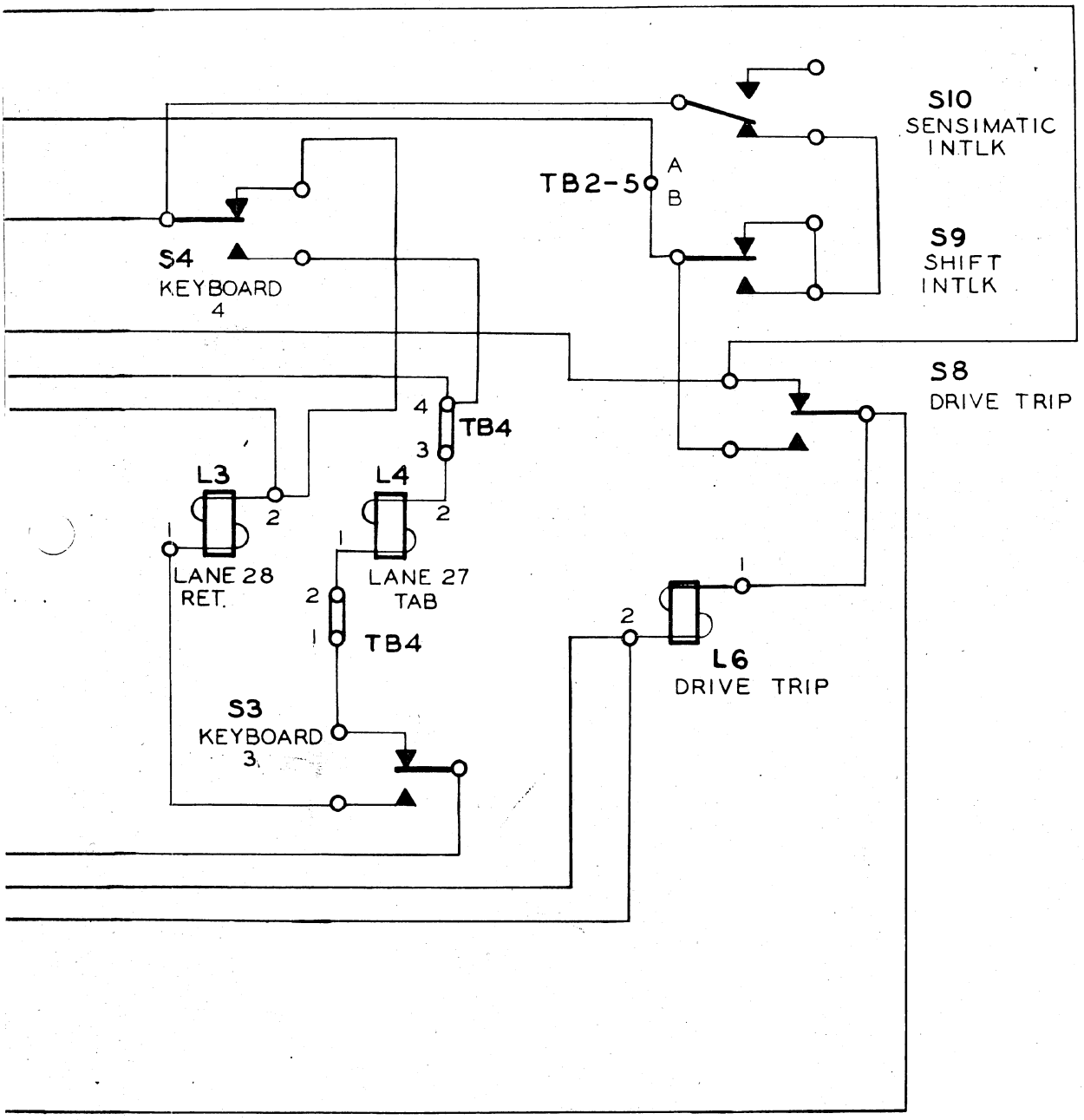


D.C. POWER SUPPLY & MOTOR WIRING

A.C. POWER SUPPLY & MOTOR WIRING




E5
J2
15
P2
E8
S1 (KEYBOARD 1)
CARRIAGE MOVEMENT
P2
9
TB2-7
B
A
TB2-6
TB2-8
A
B
TB2-9
E11
MAGNETIC
CLUTCH
P2
8
B
A
TB2-3
P2
13
S6
BACK SPACE
A
B
TB2-4
L1
2
1
LANE 30
RET.
L2
2
1
LANE 29
RET.
L5
2
1
CARRIAGE
MOVEMENT
P2
6
B
TB2-2
A
TB2-1
S2
KEYBOARD
2
S7
FULL
PWR
P2
7
A
B
S11
TAB INT'L'K
TB1-3
P2
11

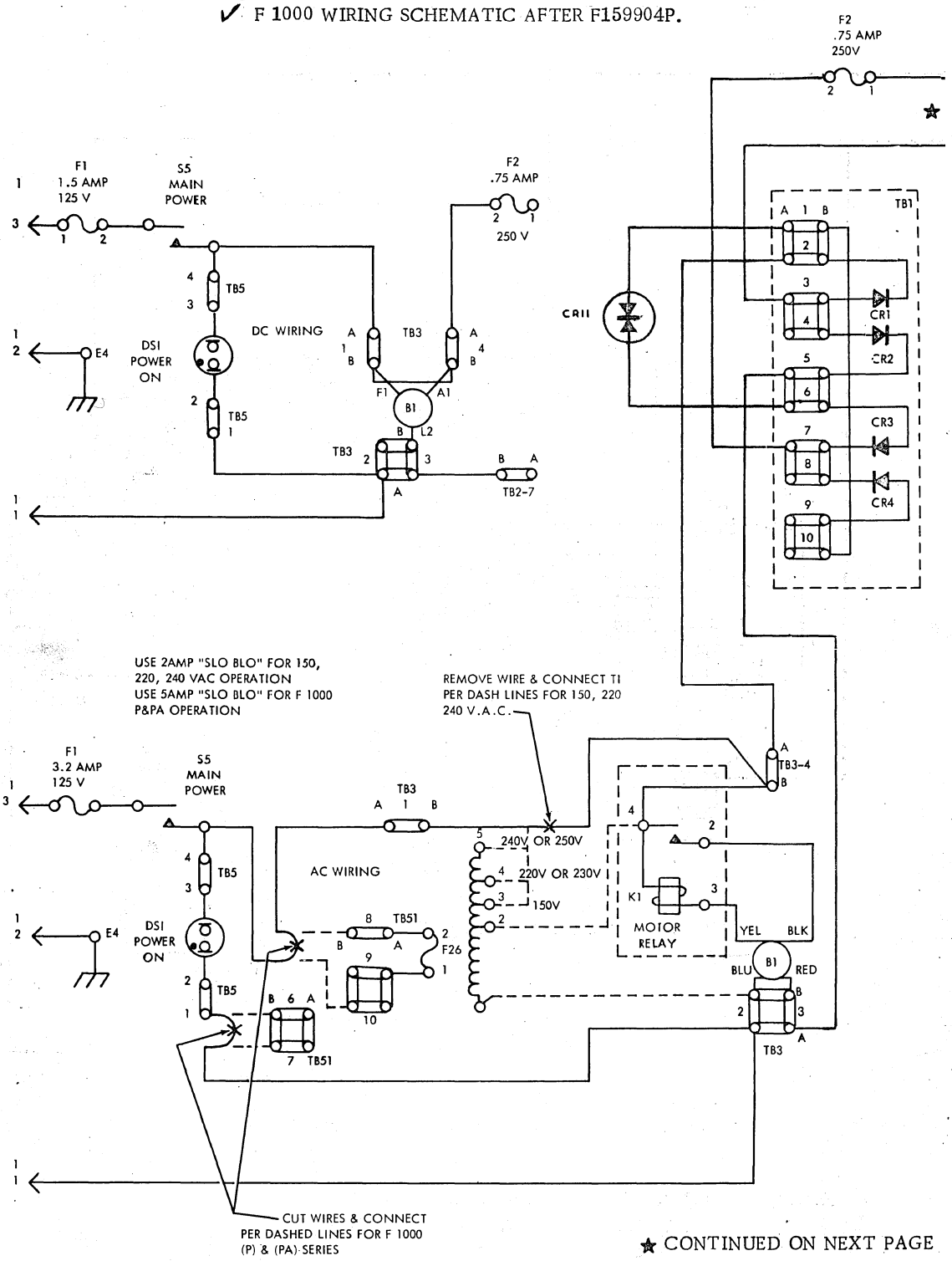

S10
SENSIMATIC
INTLK
TB2-5
A
B
S9
SHIFT
INTLK
S4
KEYBOARD
4
S8
DRIVE TRIP
4
3
TB4
L3
L4
2
2
1
1
LANE 28
RET.
LANE 27
TAB
2
1
TB4
1
2
L6
DRIVE TRIP
S3
KEYBOARD
3

NOTES

1. USE 2 AMP 250V "SLO-BLO" WITH 150V, 220V, & 240V POWER SOURCE
   USE 5AMP 125V "SLO-BLO" WHEN IN USE WITH (F1000 P & PA)
2. USE IFX417 WITH 115V AND 150VAC POWER SOURCE
   USE IFX48-4 WITH 220V AND 240VAC POWER SOURCE

UNLESS OTHERWISE SPECIFIED
RESISTOR VALUES IN OHMS
CAPACITOR VALUES IN MICRO-FARADS

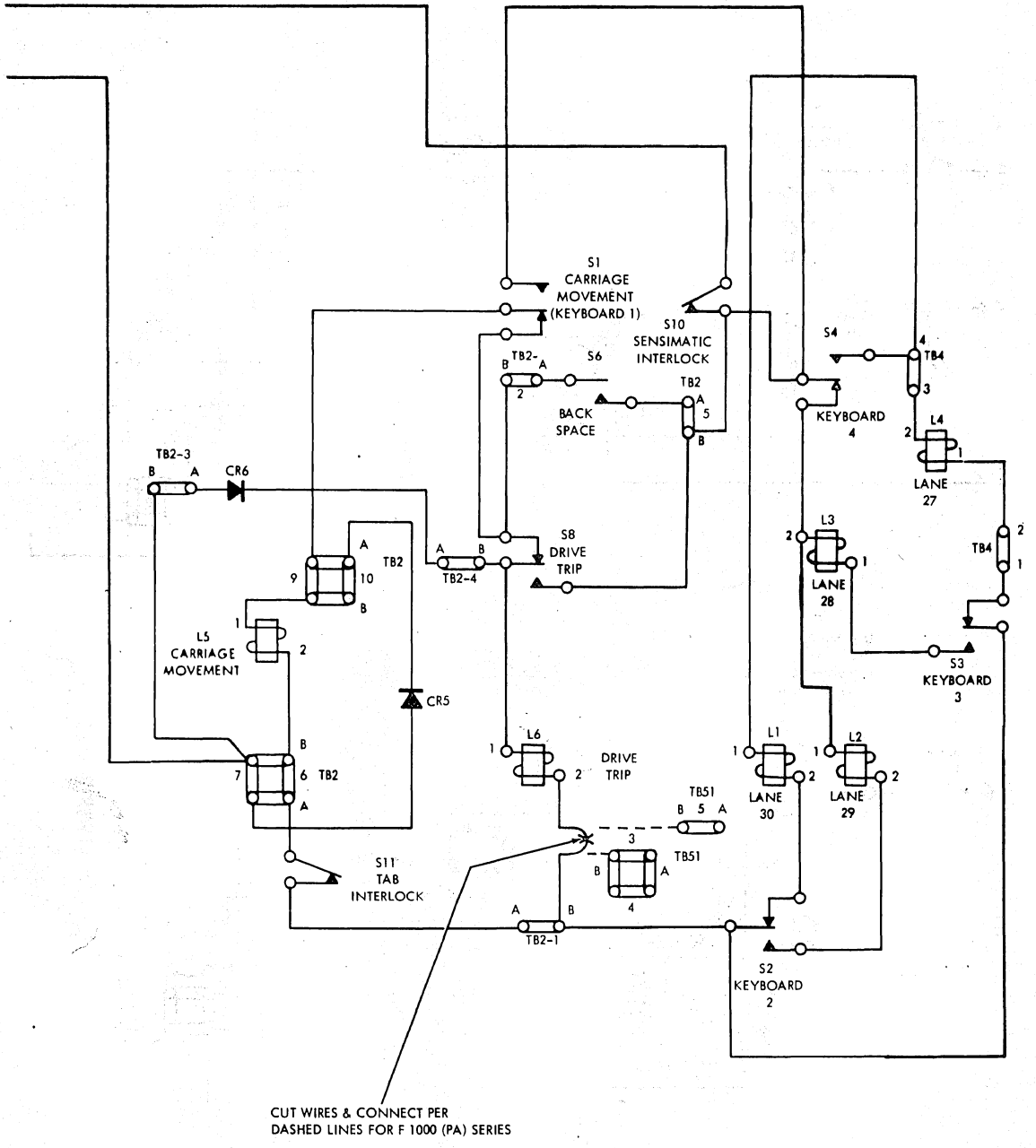
✓ F 1000 WIRING SCHEMATIC AFTER F159904P.



★ CONTINUED ON NEXT PAGE

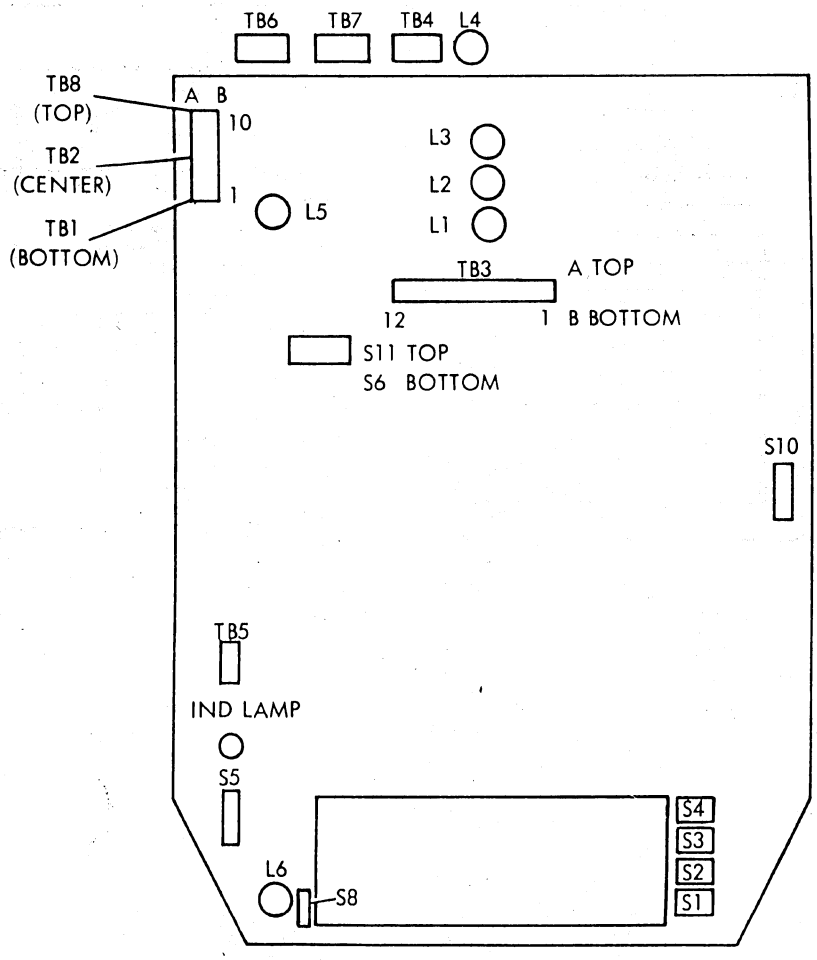
✓ Changes or additions since last issue.

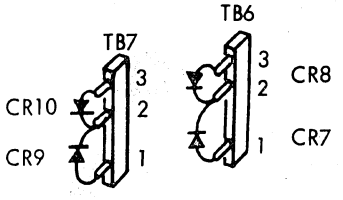
F 1000 WIRING SCHEMATIC AFTER F 159904P CONTINUED



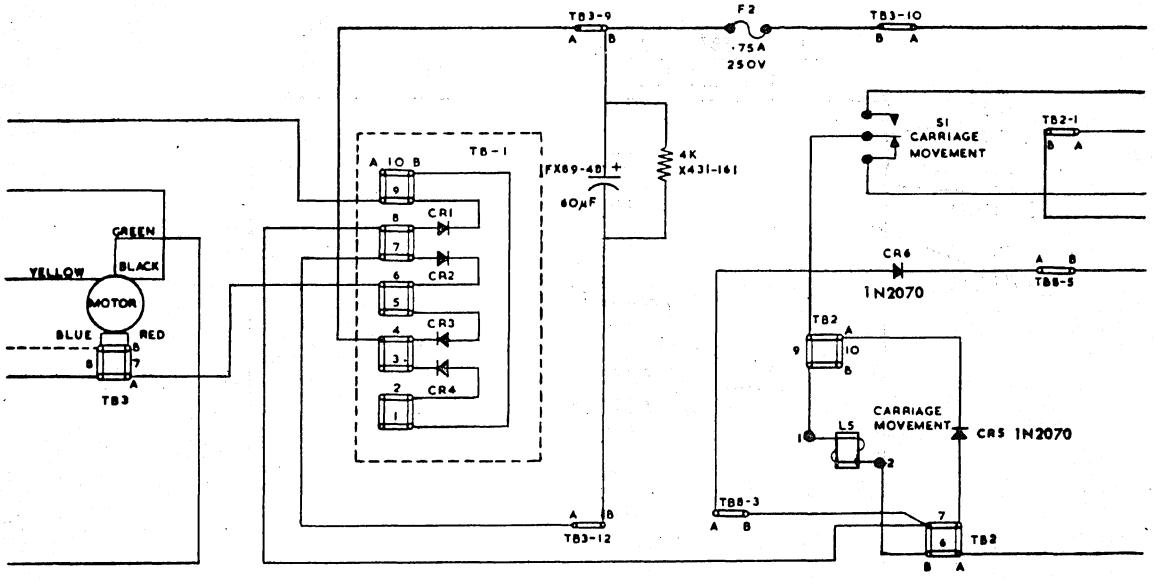
Note: Diodes CR1, CR2, CR3, CR4 are type 1N2070
Diodes CR5, CR6 are 1311 6256
Diode CR11 is 1511 7211

F1000 COMPONENT LOCATION CHART FOR MACHINES
WITH SERIAL NUMBERS ENDING WITH LETTER S



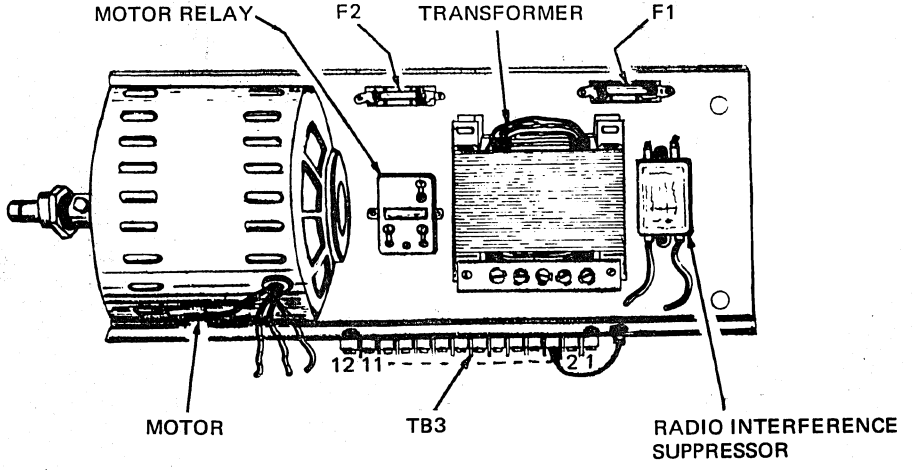


F1000 WIRING SCHEMATIC FOR MACHINES WITH SERIAL NUMBER ENDING WITH LETTER S

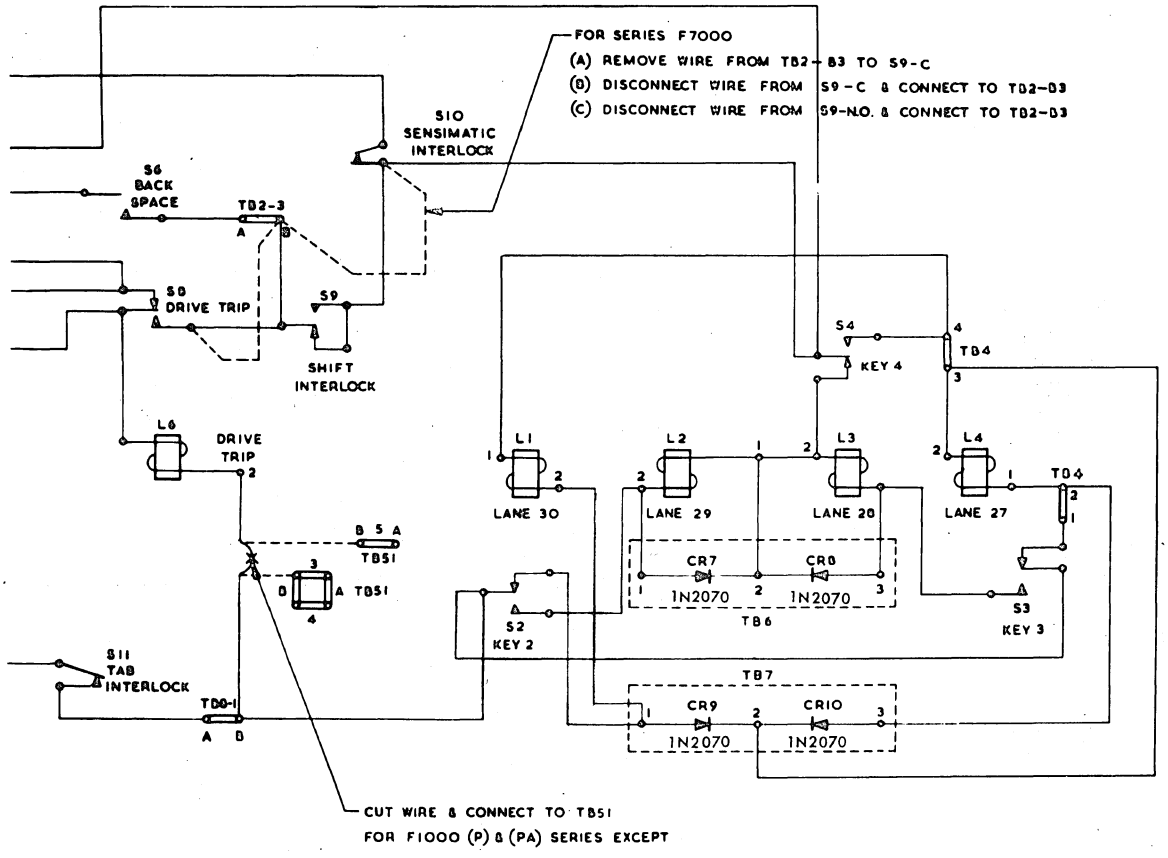


Note: Diodes CR1 thru CR4 are type 1N2070

MOTOR MOUNTING PLATE



F1000 WIRING SCHEMATIC FOR MACHINES WITH SERIAL NUMBER ENDING WITH LETTER S (CONTINUED)



Notes:

1. Below are listed the ratings and part numbers for Fuse 1 with varying AC input voltages.

Standard Machines:

Input Voltage	Fuse 1
85V to 100V	5A
110V to 140V	3.2A
150 to 250V	2V

P, PA, PV and AV Machines:

Input Voltage	Fuse 1
85V to 100V	7A
110V to 140V	5A
150V to 250 V	3.2A

2. For machines with Automatic Form Alignment carriages see schematic 1506 3225 for tie-in.

SPECIAL POWER REQUIREMENTS

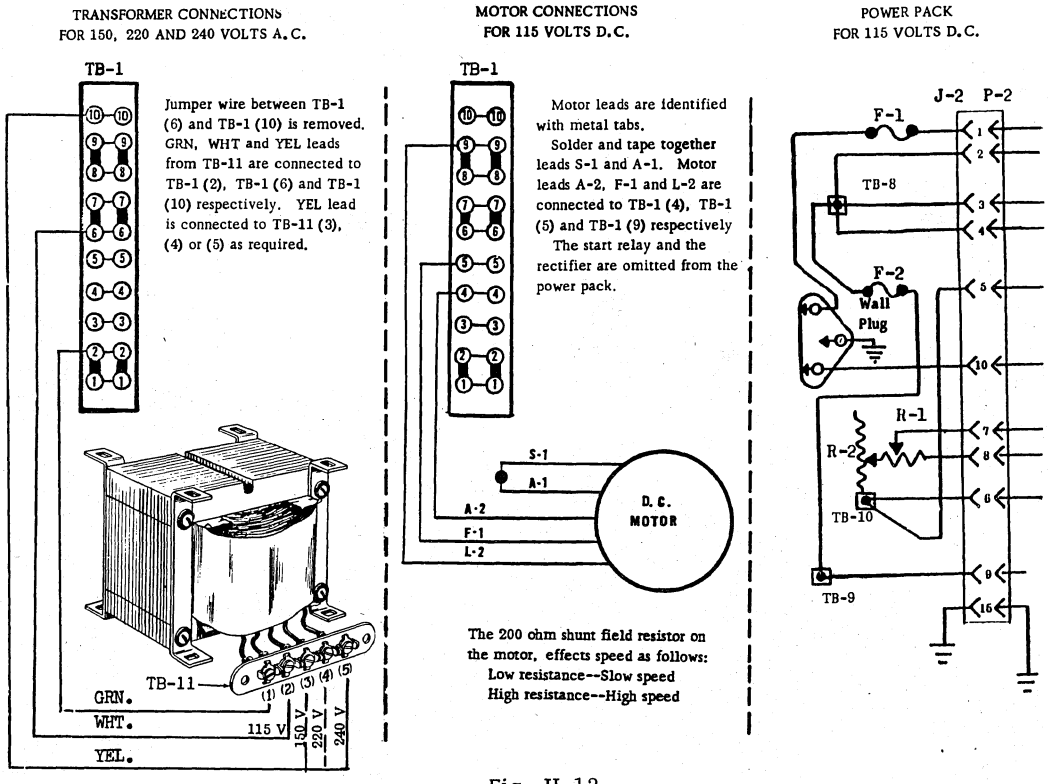

TRANSFORMER CONNECTIONS
FOR 150, 220 AND 240 VOLTS A.C.
TB-1
Jumper wire between TB-1 (6) and TB-1 (10) is removed. GRN, WHT and YEL leads from TB-11 are connected to TB-1 (2), TB-1 (6) and TB-1 (10) respectively. YEL lead is connected to TB-11 (3), (4) or (5) as required.
TB-11
GRN.
WHT.
YEL.
115 V
150 V
220 V
240 V
MOTOR CONNECTIONS
FOR 115 VOLTS D.C.
TB-1
Motor leads are identified with metal tabs.
Solder and tape together leads S-1 and A-1. Motor leads A-2, F-1 and L-2 are connected to TB-1 (4), TB-1 (5) and TB-1 (9) respectively
The start relay and the rectifier are omitted from the power pack.
S-1
A-1
A-2
F-1
L-2
D. C. MOTOR
The 200 ohm shunt field resistor on the motor, effects speed as follows:
Low resistance--Slow speed
High resistance--High speed
POWER PACK
FOR 115 VOLTS D.C.
J-2 P-2
F-1
TB-8
F-2
Wall Plug
R-1
R-2
TB-10
TB-9

Fig. II-13

150, 220 and 240 VOLTS alternating current is reduced to 115 volts A.C. for machine operation, by means of a transformer.

Attached to the mounting plate beside the motor, the Series F1000 transformer incorporates TB-11 which has five terminals; terminal No. 1 being common to the primary and the secondary windings. Leads connected to terminals TB-11 (2) and TB-11 (1) provide 115 volts when the primary lead is connected to terminals TB-11 (3), TB-11 (4) or TB-11 (5) according to the voltage available. Fuse (F-2) rating varies with voltage.

50 CYCLE ALTERNATING CURRENT can be used to operate the standard A.C. motor. The motor is constructed to operate on either 50 cycle or 60 cycle current, but the rotor speed is slower on 50 cycle. To provide correct machine speed a larger diameter pulley is used on the friction clutch. The 60 cycle pulley has 11 teeth and the 50 cycle pulley has 13 teeth.

115 VOLT DIRECT CURRENT power supply requires a special motor and, of course, modifications of the "power pack". The D.C. motor is mounted in the same manner as the A.C. motor and uses the standard construction 60 cycle motor clutch pulley. The motor start relay and rectifier are not used in power pack but in their place are "bomb tail" connectors TB-8, TB-9 and TB-10.

The D.C. motor is constructed with a 200 ohm variable resistor in the shunt field circuit for control of motor speed under load. It is set at 100 ohms which should result in approximately 110 Sensimatic cycles per minute from 115 volts D.C. Resistance adjustment should not be necessary unless line voltage exceeds 115 volts. When resistance is decreased - the movable band closer to the soldered end - speed decreases.

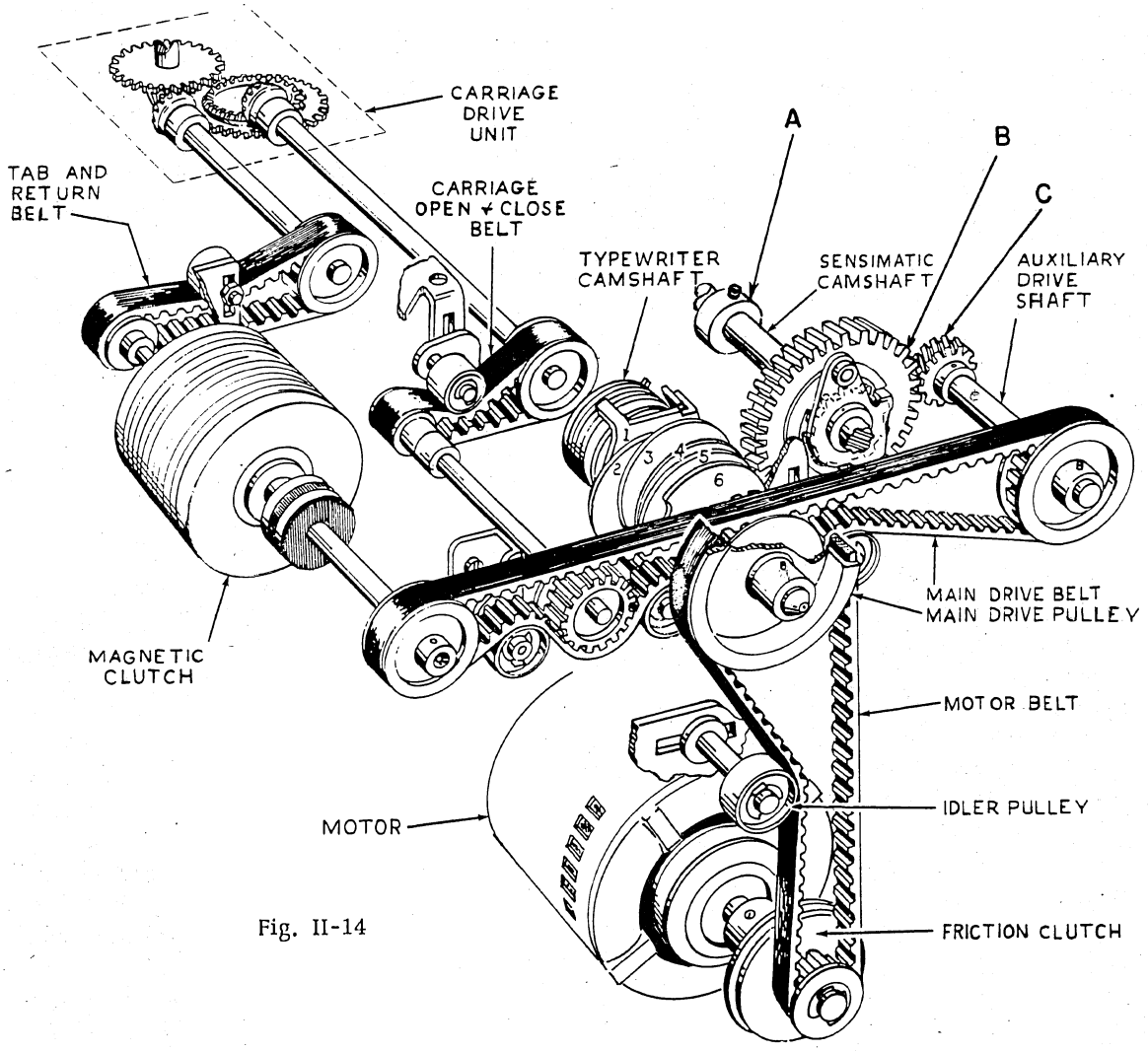


Fig. II-14

POWER-MECHANICAL

GEAR BELT DRIVE

Drive mechanism in Series F1000 machine provides continuous power for operation of the Sensimatic camshaft, the typewriter camshaft, and the carriage drive unit. Non-slip gear belts are used to transfer power from the motor to the various driving shafts to ensure proper timing of related machine functions such as carriage closing and Sensimatic printing. The motor belt transfers rotation of the motor to the main drive pulley for operation of the typewriter camshaft. The main drive belt connects the main drive pulley with the auxiliary drive shaft, the carriage open and close shaft, and the magnetic clutch. The auxiliary drive shaft provides power to the Sensimatic camshaft. The carriage open and close belt maintains constant rotation of the form space clutch and the carriage open and close clutch to enable vertical spacing during typing. The tab and return belt is driven from the magnetic clutch to provide instant power to the carriage drive unit tabulation and return clutches for escapement and other carriage movements.

Idler pulleys, located between the belt pulleys, provide maximum mesh of belt lugs with pulley teeth and provide the means of adjusting belt tension. Idler pulleys also affect running alignment of belts since they guide the belt onto the next belt pulley.

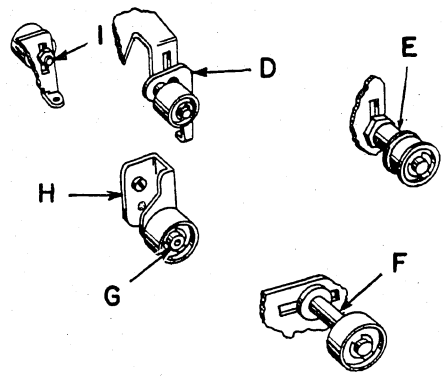


Fig. II-15

Tests and Adjustments

P28-1 With the machine normal and set screw in collar A to the rear, bronze gear B should have end play not to exceed .010".
TO ADJUST, with machine cycled from 250° to 260° and with set screw in collar A straight up, locate collar A as required.
REASON: To maintain alignment of bronze gear B with gear C and to prevent interference of set screw in collar A with left drive arm.

P4-1 All slack should be taken up on motor drive belt without raising motor out of normal position
TO ADJUST, locate idler post F in left sideframe as required.
REASON: To ensure full power transmission through belt and to maintain normal position of motor.

P4-2 All slack should be taken up on main drive belt without exerting strain on the various drive shaft bearings.
TO ADJUST, locate idler posts E and G as required.
REASON: To ensure positive mesh of belt and pulleys.
NOTE: When removing main drive belt, bracket H can be removed, and thereby breaking of adjustment can be avoided.

P4-3 There should be a slight amount of slack in tab and return belt.
TO ADJUST, locate idler post I as required.
REASON: To ensure full mesh of belt lugs with pulleys without exerting strain on bearings.

P4-4 There should be a slight amount of slack in carriage open and close belt.
TO ADJUST, locate bracket D as required.
REASON: To ensure full mesh of belt lugs with pulleys without exerting strain on bearings.
NOTE: Bracket D replaces the post of early construction to reduce flexing of the belt.

FRICTION OVERLOAD CLUTCH

The friction clutch, attached to the rotor shaft, provides slippage at heavy load points in the machine cycle and protects machine parts against breakage should the machine lock during a typing or Sensimatic cycle. Clutch slippage avoids wrong subtraction when all accumulators are active by effecting a momentary reduction in machine speed at the heavy load point.

The pulley and outer pressure disc E are one part, free to rotate on clutch arbor D. The two flat springs B and inner pressure disc A are keyed to flats of the arbor. The emboss on the innermost spring prevents castle adjusting nut C from loosening. The pressure discs and friction disc should be clean of any lubrication to avoid erratic clutch tension. The clutch arbor should have slight lubrication with heavy grease to avoid "rust like" fretting corrosion. The clutch assembly is positioned in or out on the rotor shaft for running alignment of the motor drive belt.

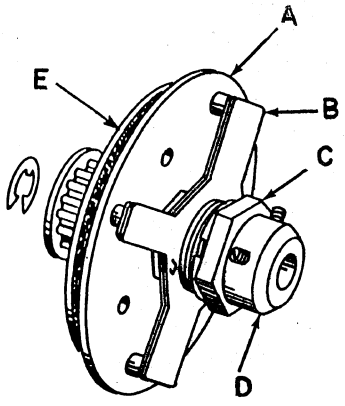


Fig. II-16

Tests and Adjustments

P13-3-1 With the friction overload clutch cool, carriage controls disabled, and no keys depressed, depress motor bar No. 2 and manually cycle the machine to approximately 100°. Slowly rotate arbor D. Friction clutch should slip at approximately 110°, then reverse the machine cycle to approximately 100° and with power on, machine should complete the cycle.

TO ADJUST,

(a) Turn castle nut C as required.

(b) Burnish clutch for one minute by stalling clutch with motor running.

(c) Permit clutch to cool and recheck as outlined in above test.

REASON: To safeguard the machine against possible damage in the event the operation is obstructed.

MOTOR

The 1/12 H. P. induction type motor, rated at 1725 R. P. M., provides power for all machine functions. It is located under the machine base and attached to the motor mounting plate. Cushion rings, which support the motor in its cradle, absorb starting torque and motor vibration. With the motor belt and mounting plate bolts removed, the motor mounting plate pivots downward to enable servicing "C" accumulator.

TYPEWRITER CAMSHAFT

The typewriter camshaft provides the driving power and the timing control of all typing functions. This assembly consists principally of six functioning cams and a spring clutch. The main drive pulley which is pinned to the shaft turns the right half of the clutch drum continuously. The left half of the clutch drum and the six cams are keyed together and held in normal position through cam No. 1. The clutch spring is coiled around the two drum halves to drive the cam assembly. Each cam is described in detail as part of later functional study such as drive trip, indexing code, etc.

MACHINE SPEED

The power required to operate the Sensimatic mechanisms and the power required to operate the typing mechanisms is approximately 1740 R. P. M. The following chart indicates the number of gear pulley teeth and the average operating speed of the power mechanisms.

	Number of Teeth	Speed in R. P. M.
Motor pulley	11	1740
Main drive pulley	34	562
Typewriter camshaft	13	562
Auxiliary drive shaft	16	456
Small gear	19	456
Large gear	75	115
Sensimatic operations - Selecting register No. 1		104 to 110 operations per minute

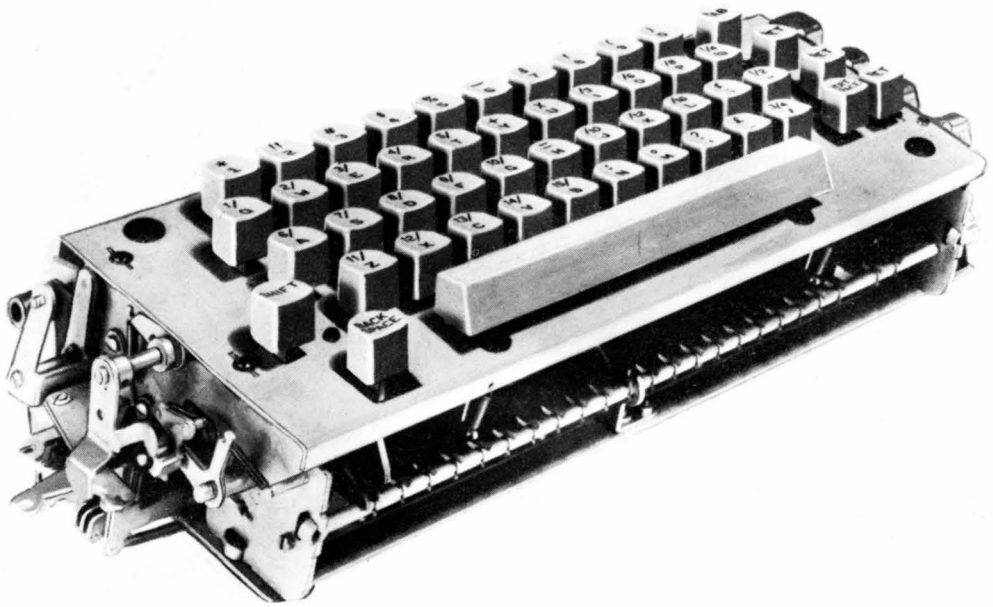


Fig. II-17

TYPEWRITER KEYBOARD MECHANISM

The typewriter keyboard is the means of indexing typing characters and carriage movements associated with typing for printing, escapement and return or tabulation to an accounting stop position.

42 typing keys with normal and shifted identification are arranged in standard four row pattern. The 26 alphabetic letters plus numerals zero through 9 and symbols normally used, can be printed with the shift key in normal position. 42 additional symbols can be printed from these same keys when the shift key is indexed. The typing positions are numbered 1 through 42 for reference purposes. The space bar is number "0" and the remaining keys are numbered in the 60 series. The keys are also designated by rows 1, 2, 3 and 4 (from front to rear). The carriage control keys, located to the right of the character keys, are designated as 61, 62, 63, 64 and identified with abbreviations "TAB" - "RET" according to their basic function.

Typical of an electric typewriter the depression of any key, except the shift key and the vertical space key, indexes a "CODE" and trips the drive. The "Code" is constructed into seven notched keyboard code slides located beneath the keylevers on the bottom plate. Arranged with these slides is the interlock assembly. This assembly prevents depression of more than one key at a time, guides the keylevers into the notches of the code slides and provides the downward limit for the keylevers. The drive is tripped through the trip shaft assembly. The cycle bail which is spring actuated and cam restored retains the keylever depressed to ensure indexing the "Code".

On the right end of the keyboard are four electrical switches which close solenoid circuits to index selective carriage movements in lanes 27 through 30. Switch combinations are actuated through three electrical code slides from depression of a carriage control key.

The vertical space key enables spacing the platen for multiple line typing, the shift key indexes a writer section function and the back space key is studied as a carriage movement.

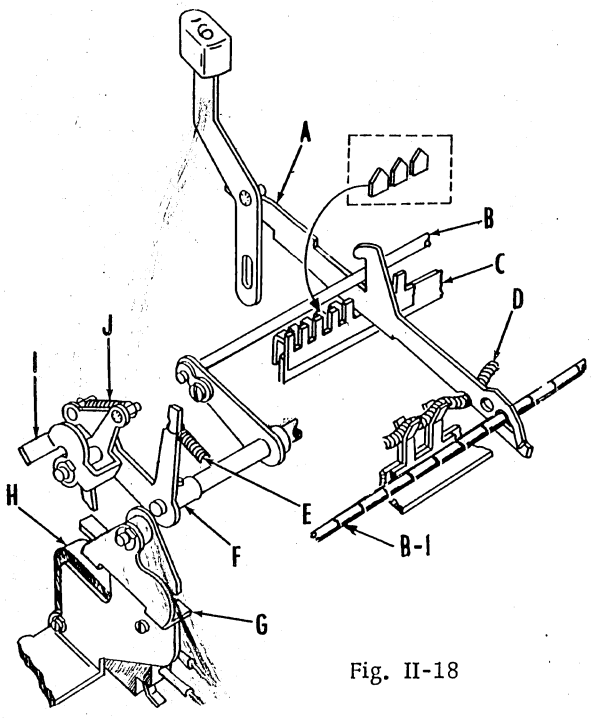


Fig. II-18

Tests and Adjustments

K6-3A With projection of key levers A held upward in groove of shaft B-1, there should be clearance not to exceed .003" between the formed ear of key lever A and large diameter of shaft B-1.
TO ADJUST, bend the formed ear of key lever A as required.
REASON: To lock key levers A in their proper position.

K6-3B With cycle bail assembly M held rearward and shaft assembly B lowered, slowly depress and release each typewriter key. All key levers A and all keystems restored by the tension of copper springs D should freely restore to their normal position.
NOTE: Check shift key, back space, and space bar to restore to their normal position.
TO ADJUST, check component parts to be free.
REASON: To ensure restoration of the indexed key.

SOLENOID DRIVE TRIP

Tripping the typewriter drive from a switch and solenoid provides "light touch" key action and ensures positive release of the typewriter camshaft spring clutch. The drive is tripped from any typewriter key except the shift key and the vertical space key.

From depression of the key, the stud in the keystem lowers keylever A into notches of keyboard code slides and into slots of interlock assembly C. The frame of assembly C guides keylever A and limits key depression. The enclosed pyramid interlocks prevent depression of other keys since there is space for only one lever between the pyramids. In event of two key depression, both keylevers should permit code slide No. 7 (described later) to move. In the downward movement of the key, the hook projection of lever A rocks trip shaft assembly F through shaft B to lower trip pawl I. Pawl I rocks switch actuating lever G to actuate microswitch H which closes the circuit to solenoid Q.

Solenoid Q when energized lowers clapper R to release trip arm S. Driven from spring V cycle bail shaft assembly M is rotated - positioning bail N over the hook projection to hold keylever A depressed. Arm S moving forward, rocks trip pawl I clear of switch actuator lever G to permit the switch contacts to open. Through link U moving forward, bellcrank K is rocked clear of the vertical projection of clutch spring L. Spring L then contracts gripping the rotating drum to drive the cam assembly from the main drive pulley. In event keylever A is partially depressed and drive is tripped as from snap depression of two keys, the spring connection of bail N permits full movement of trip bellcrank K - thus assuring positive release of the spring clutch.

Restoring of the indexed key from cam W occurs at approximately 200° of the typewriter camshaft rotation. The high point of cam W rocks bellcrank K into the path of clutch spring projection L and through link U and eccentric T restores cycle bail assembly M. As bail N clears keylever A, spring D restores the keystem through keylever A, and spring E restores trip shaft assembly F. This allows spring J to reset pawl I over switch actuating lever G.

Disengagement of the spring clutch occurs near the end of the camshaft cycle. The vertical projection of spring L contacts trip bellcrank K and momentum of the cam assembly expands spring L, freeing it from the rotating drum. Overthrow of the cam assembly is prevented by the formed ear of cam W limiting against bellcrank K and rebound is prevented by detent X dropping behind the formed ear. Disengagement of all coils of spring L is aided by the second formed ear of cam W.

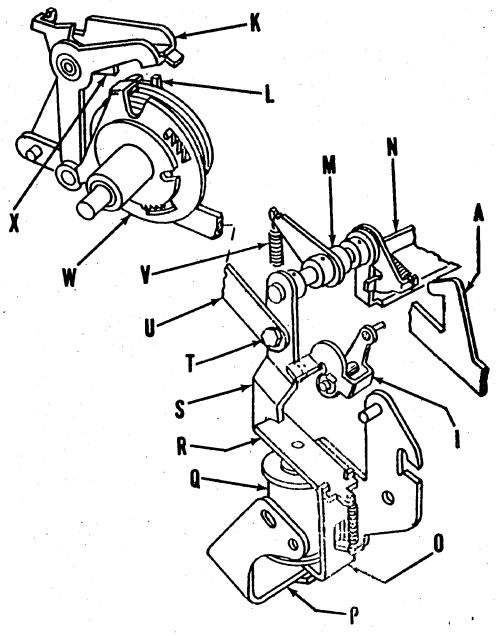


Fig. II-19

Cl 1003

Tests and Adjustments

K6-7 With switch actuator G limiting on lower surface of slot in bracket P and two typewriter keys depressed simultaneously, there should be .003" to .005" clearance of drive trip pawl I over switch actuator G. Test various two key combinations on left, right, and center of keyboard.

TO ADJUST, loosen nuts on bracket P and locate rear of bracket P.

REASON: To ensure resetting of trip pawl I during rapid typing.

K6-8 With power off and keystem fully depressed, there should be .001" to .003" clearance between the formed ear of drive trip pawl I and the hump of latch arm S.

TO ADJUST,

(a) Bend mount bracket for clapper R to be parallel with solenoid Q.

(b) Slightly bend formed ear of drive trip pawl I.

REASON: To ensure full throw of drive trip pawl I.

K6-9 With power off, trip the drive, and manually cycle the typewriter camshaft until the high point of cam W moves link U completely rearward. With clapper R held rearward to take up any play, there should be .010" to .015" reset lead of drive trip arm S beyond solenoid clapper R.

TO ADJUST, turn eccentric T.

NOTE: Excessive reset lead will cause excessive drop back and result in insufficient blocking of cam assembly overthrow.

REASON: To ensure safe reset of solenoid clapper R and a minimum of .060" hold of clutch latch K on ear of cam W and projection of clutch spring L.

K6-10 With clapper R limiting on solenoid Q, there should be .010" to .015" clearance of trip arm S over clapper R.

TO ADJUST, bend trip arm S at offset to lengthen or shorten.

REASON: To ensure release of trip arm S and to provide a proper air gap between clapper R and solenoid Q.

NOTE: To overcome possible residual magnetism between clapper R and trip arm S, the step of arm S forms a 10^{o} angle with the top surface of clapper R.

K6-11 The contact points of switch H should close when any typing key is .060" to .065" from full downward travel. Test with thin "S" wrench, Kit 19 No. 2, placed between keytop and keyboard top plate.

TO ADJUST, raise or lower switch H on its mounting screws.

REASON: To ensure indexing code prior to drive trip.

P1-1-1 Trip the drive and manually cycle the typewriter camshaft until the vertical projection of spring L contacts bellcrank K. There should be .156" to .218" clearance between the limit surface of bellcrank K and the leading edge of formed ear of cam W.

TO ADJUST, reposition horizontal projection of spring L in adjusting notches of cam spacer.

REASON: To provide sufficient drive of typewriter clutch to latch typewriter camshaft without excessive force of cam W against bellcrank K.

TYPEWRITER DRIVE TRIP INTERLOCK

This interlock prevents a machine lock in the ribbon feed mechanism, which would occur from simultaneous operation of the Sensimatic camshaft and the typewriter camshaft, by preventing drive trip of one clutch when the other is active.

Located on the left sideframe, the lower arm of interlock C in engaged over the stud of typewriter drive trip link D. The upper arm is a hook projection which functions with formed ear extension B of Sensimatic trip shaft assembly A.

When the typewriter drive is tripped, link D moves forward rocking the hook projection of interlock C over trip shaft extension B to prevent movement of Sensimatic trip shaft A. When the Sensimatic drive is tripped, lever B rocks upward into the path of interlock C to prevent forward movement of typewriter drive trip link D. In event a typing key is indexed during a Sensimatic cycle, the movement of interlock C and link D must be kept to a minimum to avoid a partial typewriter drive trip.

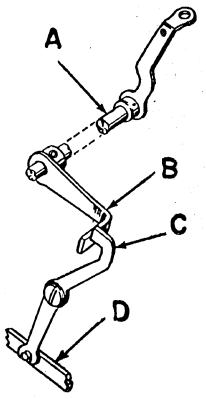


Fig. II-20

Tests and Adjustments

These adjustments should follow the typewriter drive trip adjustments and should be checked anytime typewriter drive trip or the normal position of Sensimatic trip shaft A is changed.

P26-4 With typewriter drive link D in normal position and trip shaft A released, there should be no more than .005" clearance between the vertical surface of interlock C and the formed ear of arm B.
TO ADJUST, weave the formed ear of B as required.
REASON: To ensure typewriter is disabled when Sensimatic drive is tripped.

P26-5 With Sensimatic trip shaft A in normal position and typewriter drive tripped, the hook projection of interlock C should clear over the formed ear of arm B by .010" to .015".
TO ADJUST, loosen set screws in B and reposition arm B on shaft A.
REASON: To ensure sensimatic drive trip is disabled when typewriter drive is tripped.

ELECTRICAL DRIVE TRIP INTERLOCK

Sensimatic switch (S-10) is used in the solenoid drive trip circuit to prevent typewriter drive trip during a Sensimatic cycle. This avoids a machine lock through the ribbon feed mechanism and minimizes the possibility of indexing a typing cycle which would complete after the Sensimatic cycle and escape the carriage .1".

Located on the "bicycle" (auxiliary right) sideframe, the normally open switch is held actuated by the keyboard restoring bail for the motor bars and accumulator control keys. Electrical wires are connected to the normally open (NO) and the common (C) terminals and can be traced in a series circuit through drive trip solenoid (L-6) and keyboard switch (S-8) on the wiring diagram.

When a Sensimatic motor bar or accumulator control key is depressed, restoring bail A rocks rearward raising switch actuator B and permitting switch C to open the circuit to typewriter drive trip solenoid. At approximately 320° of sensimatic cycle, restoring bail A rocks forward lowering switch C to close the circuit and permit use of typing keys. In event a typing key is held depressed during a Sensimatic cycle, the reclosing of switch contacts will, of course, cause typewriter drive trip.

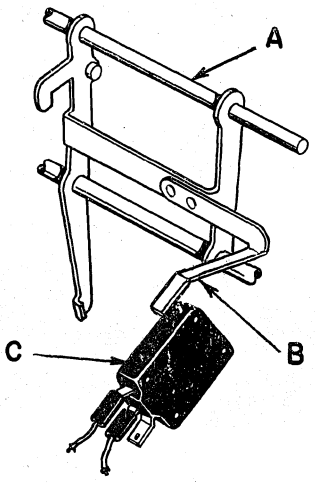


Fig. II-21

Tests and Adjustments

P26-7 With the machine normal, there should be .050" to .060" between the offset on the formed ear of actuator B and the body of switch C.
TO ADJUST, bend actuator B as required.
REASON: To ensure transferring the switch contacts without overdriving the switch plunger.

ELECTRICAL SHIFT KEY INTERLOCK

Shift key switch (S-9) is used in the solenoid drive trip circuit to prevent typewriter drive trip when the shift key is partially depressed. Partial depression of the shift key locates the shift link to engage both the right and the left directional levers. Drive trip at this instant may lock the machine and bend or break writer section parts.

Shift key switch D is located on shift bracket B between the two left sideframes and is actuated by shift bellcrank E from depression of the shift key. This is a direct movement switch with open contacts when the actuator is partially moved. A jumper wire between the normally open (NO) terminals enables a "closed circuit" when the switch actuator is normal or fully moved. Wires from the switch connect in a "series" circuit with keyboard switch (S-8) and drive trip solenoid (L-6) as shown on Wiring Diagrams.

From partial depression of the shift key through wire link C and switch actuator E the moveable switch contact separates from the normal closed contact. With continued depression of the key, the moveable contact closes with the other contact to permit drive trip for characters in shifted position. Restoring of the switch to normal occurs with restoring of the shift key. The movable contact, of course, also provides an open circuit with the shift key partially restored.

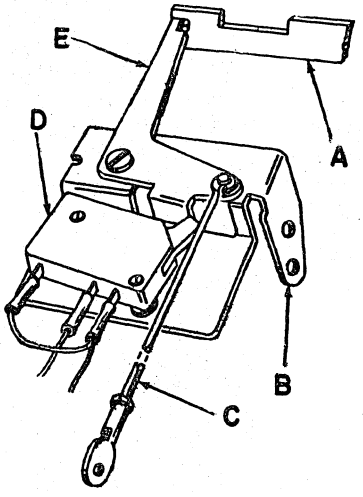


Fig. II-22

Tests and Adjustments

P26-8 Switch D should reclose when the shift key is .040" to .053" from maximum downward travel.
TO ADJUST, locate switch D on bracket B as required.
REASON: To ensure that typewriter keyboard switch is active only when the shift key is in normal or fully depressed position.

TAB INTERLOCK SWITCH (S11)

Tab interlock switch A is mounted on bracket D which is fastened to the escapement unit top plate.

Spring B through switch actuator C holds switch A in closed position. Lever E, activated either by indexing a tab or return operation or a carriage opening operation, pulls switch actuator C away from switch A, allowing switch A to open. Opening of switch inactivates tabulation and return solenoids L-1, L-2, L-3 and L-4 and also drive trip solenoid L-6.

Tab interlock switch A prevents solenoid drive trip when a tab or return operation is indexed. It also prevents solenoid drive trip when the carriage is open.

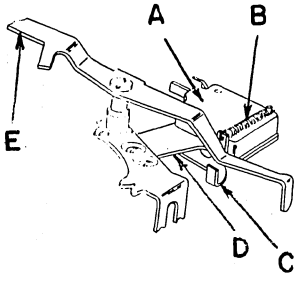


Fig. II-23

Tests and Adjustments

C36-3 With the carriage closed, switch plate D moved completely forward, and the tab or return paddle arm held indexed by the respective stop latch, there should be .005" to .020" clearance between the plunger of switch A and the forward ear of switch actuator C.
TO ADJUST, bend the rear formed ear of switch actuator C as required.
REASON: To ensure transfer of switch contacts.

KEYBOARD CODE

Seven code slides provide a mechanical means of transferring the index from a typewriter key position into lateral control for subsequent locating and printing of the selected character.

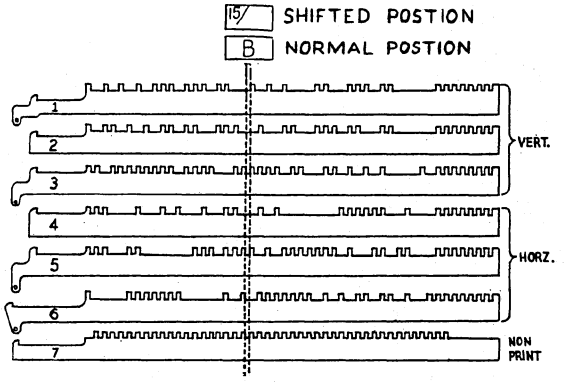


Fig. II-24

The code slides are numbered for reference purposes from the rear of the keyboard. Slides No. 1, No. 2 and No. 3 provide the vertical code and slides No. 4, No. 5 and No. 6 provide the horizontal code. Each code slide is held in its normal position (to the right) by a spring to provide alignment of its cutouts with the key levers. The blocking of certain slides and the permitting of certain slides to move to the left as provided by the cutouts, determines the "code" for each key position. The "code" for character "B" shows the relative position of the key lever and the projections of the code slides. Slides No. 1, No. 3, No. 5 and No. 7 will be blocked and slides No. 2, No. 4 and No. 6 will be "active" (free to move to the left).

Code slide No. 7, when moved to the left, indexes disabling of the writer section to prevent printing. Therefore, its movement is blocked when any character key is depressed. Slide No. 7 is active when the space bar, the back space key (position 66) or any carriage control key (positions 61 through 64) is depressed.

TRANSFERRING THE CODE

Cam No. 6, through follower bail A, holds code actuating slides H forward when the typewriter camshaft is in normal position. At the beginning of the camshaft cycle (approximately 3°), follower arm K drops off the high point of the cam. Driver spring J then pulls the active code actuating slides rearward until they limit on eccentric post G. Through bellcranks F the active keyboard code slides are moved to the left. The upper rear projection of the active slide H rocks bellcrank I to lower link D and lower code driving link B over driving bail C in the coding head. Code actuating slide H, which is blocked through keyboard code slides by the depressed key lever, should not move bellcranks I.

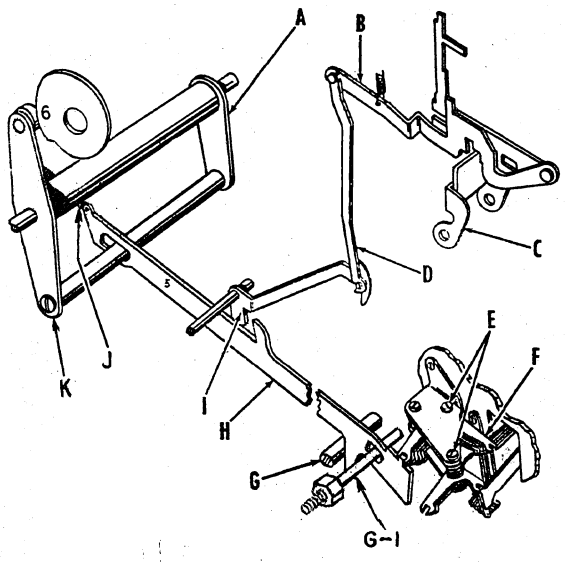


Fig. II-25

Later in the camshaft cycle, at approximately 180°, the high point of cam No. 6 rocks bail A forward to restore the code slides to normal position. Early restoring of the code slides permits release of the depressed keystems before completion of the typewriter camshaft cycle, to permit early index of the next typing key.

Tests and Adjustments

K6-4 There should be a full hold minus .005" to .010" of the projections on the code actuating slides H in the forked projections of bellcranks F.
TO ADJUST, raise or lower post G-1 in auxiliary sideframe as required.
REASON: To ensure safe clearance between the projections of code actuating slides H and adjacent bellcranks F.

K6-5 With typewriter camshaft in normal position, code slides H should mesh freely with the fork arms of bellcranks F.
TO ADJUST, move pivot screws E in the slotted mounting bracket.
REASON: To ensure that keyboard code slides are in home position and will not interfere with key depression.

K6-5A With typewriter camshaft in normal position, there should be .125" clearance between the front projections of code actuating slides H and eccentric nylon limit post G.
TO ADJUST, turn eccentric nylon limit post G as required.
REASON: To provide a limit for active code actuating slides.

K6-6 With the No. 36 key (period key on standard keyboards) depressed and typewriter camshaft rotated manually about 10°, there should be .010" to .015" clearance between the rear projections of code actuating slides H and bellcranks I.
TO ADJUST, bend code levers B up or down as required.
REASON: To ensure that code levers B are not actuated from inactive code actuating slides H.

SPACE BAR

The space bar provides a means of separating words with a .1" space. This is accomplished by indexing code slide No. 7 and tripping the drive.

When the space bar is depressed, stud D in the right arm of the space bar rocks bail G, which lowers keylever J into the cutouts of the keyboard code slides to block slides 1 through 6. Keylever J is also lowered into slot of the interlock assembly to prevent simultaneous depression of space bar and a typewriter key.

Stud L in the left arm of the space bar rocks bail K to activate the drive trip switch in the same manner a character key would do.

When cam No. 6 releases the code actuating slides, stud N in slide No. 7 moves rearward and clears bail O. This permits spring Q to rock bails O and P. The upper arm of bail P moves slide A rearward. Slide A pulls driving pawl B clear of driving bellcrank C on the power transfer shaft.

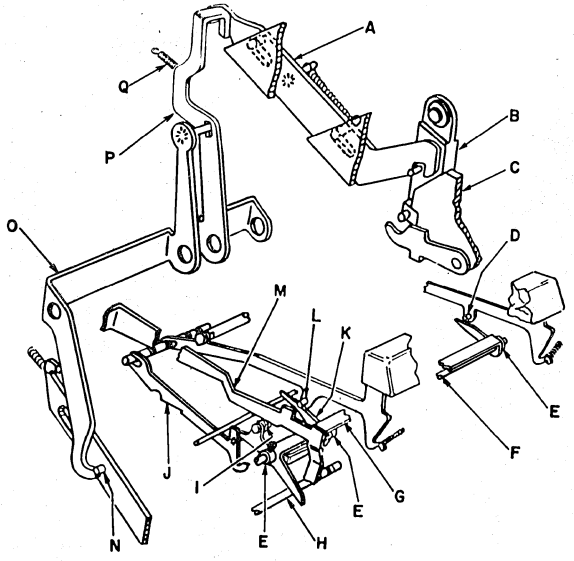


Fig. II-26

Tests and Adjustments

K6-1 Eccentric I in bail G should have at least a full hold on the lower flat projection of back space lever M, and stud L in left arm of space bar should have at least a full hold on arm of bail K.

TO ADJUST, locate (3) set collars E on shaft assembly F as required.

REASON: To ensure that bails G and K will be actuated by the space bar and the back space key.

K6-2 With left arm of bail G limiting on shaft H, there should be .005" to .010" clearance between the right arm of bail G and stud D in right space bar arm.

TO ADJUST, weave bail G as required.

REASON: To ensure blocking of keyboard code slides (1 through 6) prior to a drive trip when the space bar is depressed.

K6-3 With back space lever M held against rubber pad in upper keyboard plate and left arm of bail G limiting on shaft H, there should be clearance not to exceed .020" between eccentric I and lower flat projection of back space lever.

TO ADJUST, turn eccentric I as required.

REASON: To ensure blocking of keyboard code slides (1 through 6) prior to a drive trip when the back space key is depressed.

TYPEWRITER CARRIAGE CONTROL KEYS

Carriage control keys in position 61, 62, 63 and 64 provide a means of indexing carriage movement to reposition the carriage after typing the posting description.

The carriage control keys trip the typewriter camshaft drive (as from a character key), index code slide No. 7 and block code slides No. 1 through No. 6. In addition, these keys actuate electrical code slides to index electrical code. This is provided in the construction of four bails and three electrical code slides. The code slides actuate a combination of two or more switches which close circuits to solenoids No. 1 through No. 5.

The depression of "tab" key (position 64) rocks bail F to move slide D forward. The actuator arm of slide D actuates switch No. 4 and the forward projection rocks bail A, which in turn actuates switch No. 1.

The electrical code slides C, D and E are held in indexed position during the camshaft cycle by latch B. This ensures retaining the electrical code index of the switches. The spring stud in the keyboard trip shaft assembly, moves downward with the depression of the keystem, permitting latch B to engage the notches of slides C, D and E. Latch B is raised and the electrical code slides restore at approximately 200° when the keyboard cycle bail is restored from cam No. 1.

The other carriage control keys function in a similar manner as described for key No. 4 and the chart below indicates the switches actuated.

Key Depressed	Slide Moved	Switches Actuated
1	E	1 and 3
	D	1 and 4
2	C	1 and 2
3	E	1 and 3
4	D	1 and 4

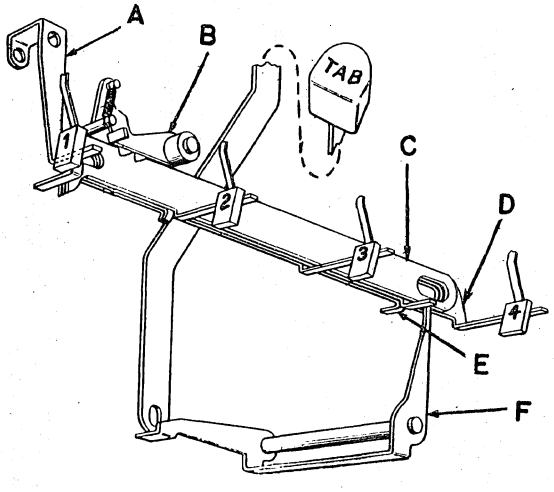


Fig. II-27

Tests and Adjustments

K6-12 When carriage movement keys 1, 2, 3, or 4 are slowly depressed, latch B should engage the notches of the electrical code slides just prior to tripping the drive.
TO ADJUST, weave the formed ears of bails F near points of contact with keystems.
REASON: To ensure that electrical code slides C, D, and E are fully latched prior to tripping the drive.

K6-13 When carriage movement keys 1, 2, 3, and 4 are slowly depressed, the active carriage movement switches should close simultaneously just prior to latching of electrical code slides on latch B.
TO ADJUST, bend insulated switch actuators as required.
REASON: To ensure that carriage movement switches are fully closed prior to tripping the drive.

FORM SPACING

The form space key in typewriter keyboard position 60, provides a means of spacing the forms vertically anytime the machine is operable. This is possible because the carriage drive unit form space clutch is driven continuously from the main drive belt.

Depression of the space key, through key lever C and slide D, rocks space bail E. The lower arm of bail E contacts the step of wire link F, moving it and the wire forward. Through lever A, the space shaft assembly in the carriage drive unit is rocked to engage the form space clutch.

Near the end of downward movement of the keystem, the lower arm of bail E disengages from the step of wire link F -- permitting lever A to restore and provide only one space operation each key depression.

Slide D for the formspace key and a similar slide for each of carriage control keys No. 1, No. 2, No. 3 and No. 4 provides spacing when in lower position and disables spacing when in upper position.

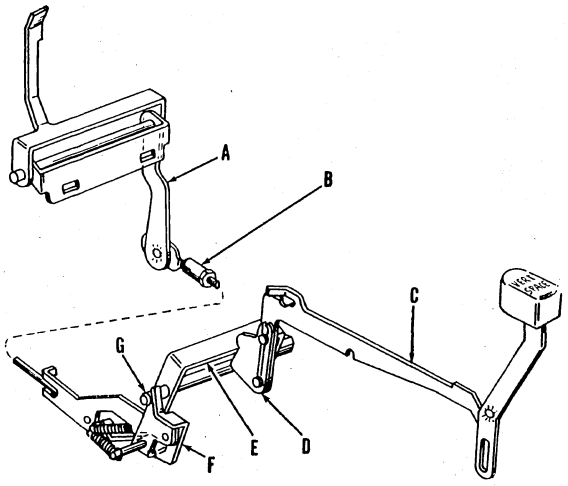


Fig. II-28

Tests and Adjustments

C23-1-1 With trigger bail E limiting against slide D and trigger latch F limiting on post G, there should be .010" to .035" clearance between the driving edge of trigger bail E and trigger latch F.
TO ADJUST, bend formed ear of trigger latch F at point of contact with post G as required.
REASON: To ensure sufficient throw of space mechanism and reset of trigger bail beyond trigger latch.

C23-1-2 When the vertical space key is slowly depressed, the vertical space clutch should engage just prior to release of trigger latch F from trigger bail E.
TO ADJUST, lengthen or shorten the wire through turn buckle B.
REASON: To ensure engagement of vertical space clutch.

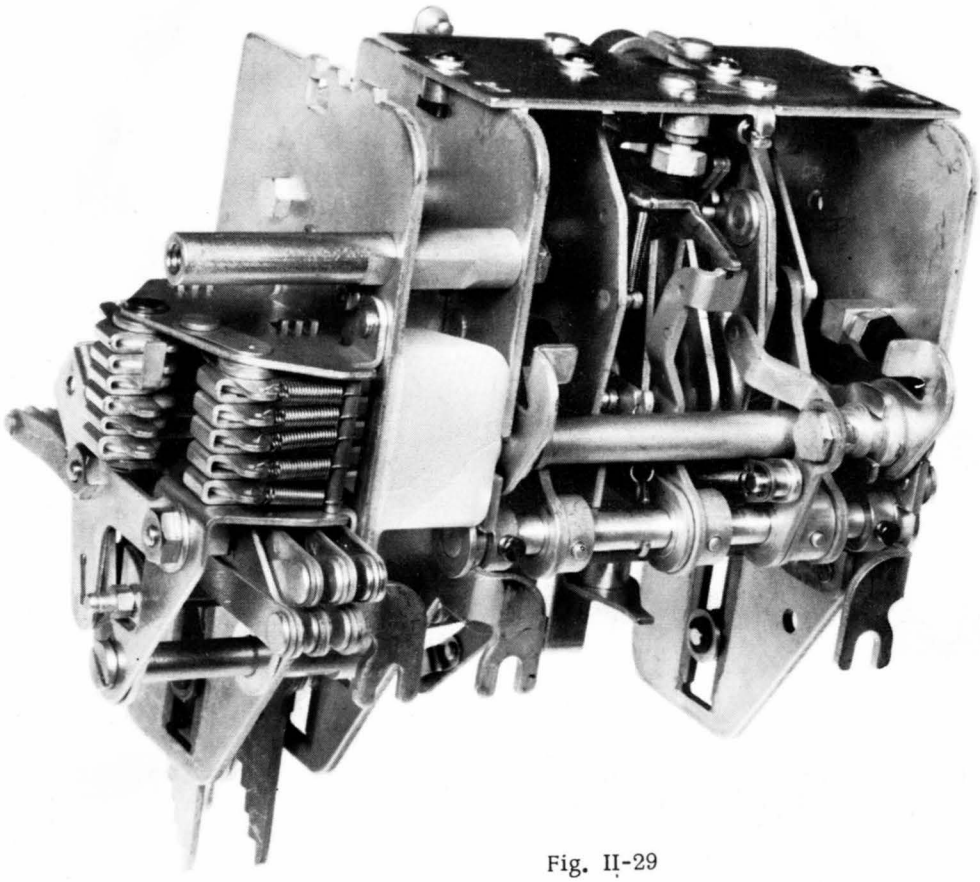


Fig. II-29

WRITER SECTION

The writer section provides a means of transferring the code indexed from the keyboard into horizontal and vertical limits for the type box, a means of shifting the type box to its selected position, and a means of printing the selected character.

To accomplish these functions, the writer section consists of the coding head, the type box, the transport mechanism and the printing hammer assembly. The coding head is the means whereby the keyboard code is converted into one of six vertical and one of seven horizontal limits to control movement of the type box. The transport mechanism shifts the box to its proper position and releases the printing hammer. The type magazine in the shape of a box contains 84 single piece type; 42 normal selected and 42 shift selected positions to coincide with the keyboard characters.

The power transfer shaft provides a means of controlling lift and restoring of the type box, firing and restoring of the printing hammer assembly and the means of lifting the ribbon to printing position. Indexing movement of the power transfer shaft is from cam No. 2 of the typewriter camshaft through the driving pawl. The restoring movement is from cam No. 3 through the restoring stud.

CODING HEAD

The coding head is constructed with two groups of code stops; six code stops for vertical control and seven code stops for horizontal control. The uppermost code stops are stationary, but all others are movable and are interconnected with bellcrank assemblies. The group of five bellcranks controlling the vertical code, is actuated by code driving levers 1, 2 and 3. The group of six bellcranks, controlling horizontal code, is actuated by code driving levers 4, 5, and 6.

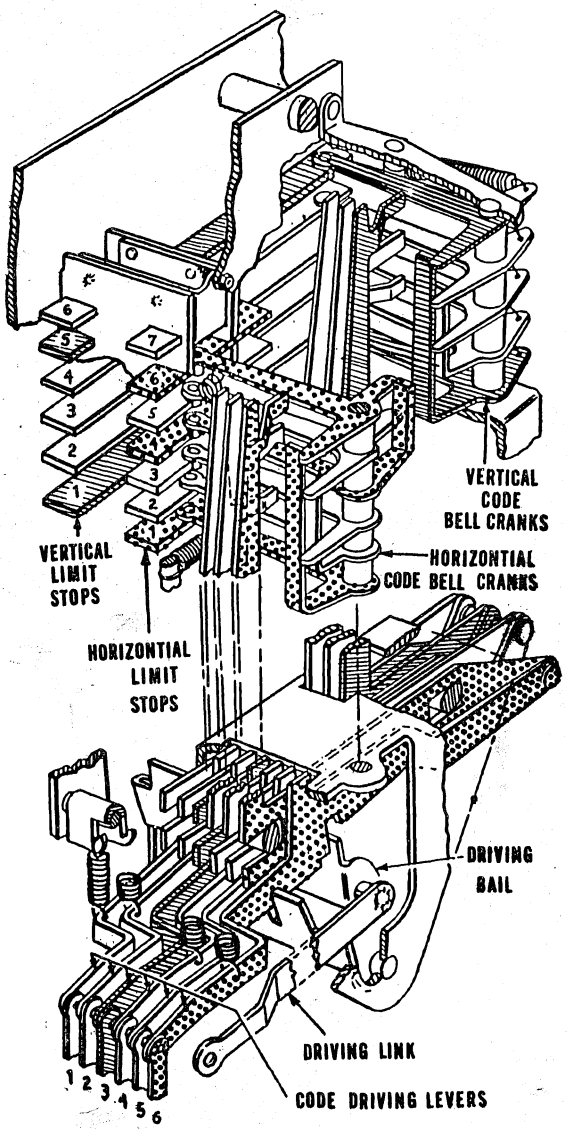


Fig. II-30

At approximately 3° in rotation of the typewriter camshaft, cam No. 6 permits the code actuating slides to lower the active code driving levers over the driving bail - thus indexing the coding head. At approximately 35°, cam No. 4 through the driving link and the driving bail moves the active code driving levers forward. The upper end of the lever, contacting its respective bellcrank, moves the code stop forward to an inactive position. Through overlapping tails on the code bellcranks, other code stops are moved forward to be inactive. The lowest code stop, both vertical and horizontal, that is not moved determines the position of the type box. The "shaded" levers (Fig. II-30) illustrate the code for character "A".

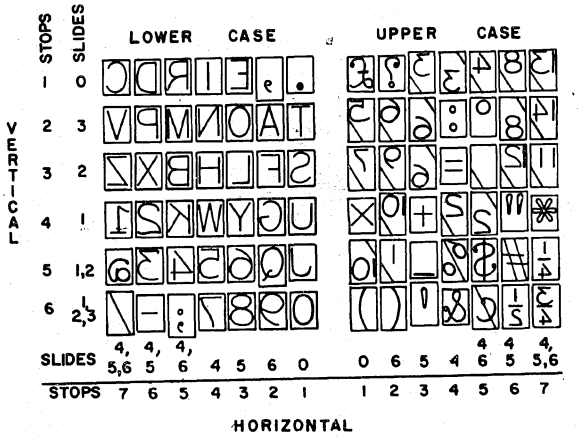


Fig. II-31

TYPE BOX

The type are arranged in the type box so that the character coinciding with that of the depressed key is moved to printing position. The keyboard code slide or slides permitted to move determine, by means of the actuating slides, the code driving levers moved. The code bellcranks, driven by the driving lever, and the overlapping tails of the bellcranks determine the code stops moved and thus the active (lowest unmoved) code stop. Illustrated in chart form (Figure II-31) is the type position in the type box showing the keyboard code slides moved and the code stops active for each type position.

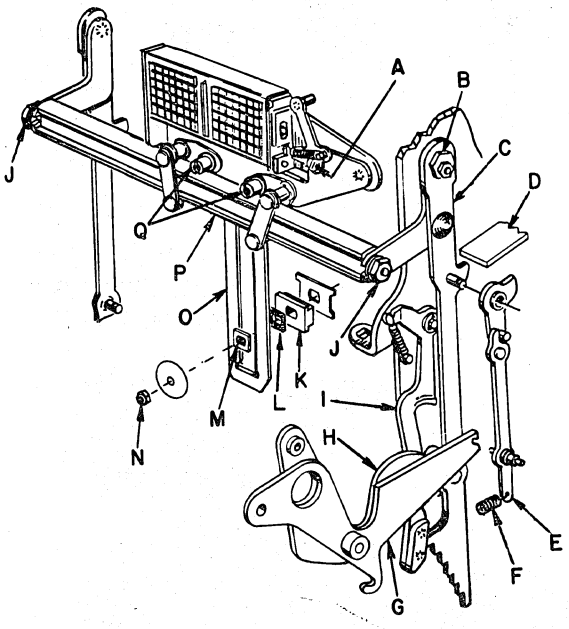


Fig. II-32

POSITIONING THE TYPE BOX

Vertical movement of the type box is provided by toggle link E, lift slide C and raise bail P.

At approximately 35° of typewriter camshaft rotation, toggle arm G of the power transfer shaft moves (vertical) toggle link E upward, which through lift slide C and raise bail P raises the type box carrier O. When toggle link E contacts the active code stop D, breaking the toggle, spring F expands. The projection of lift slide C then contacts code stop D to prevent further upward movement of the type box. The power transfer shaft arm G continues its upward movement to the point of maximum travel. Simultaneously, roll arm H of the power transfer shaft holds rebound latch I clear of steps on lift slide C, but when slide C stops, rebound latch I moves into the active step. Near the end of upward travel, roll arm H through rebound latch I raises and holds the vertical lift mechanism in its selected position.

Horizontal movement of the type box occurs simultaneously with vertical movement. The horizontal toggle link Y, lift slide Z and rebound latch AA are moved from the power transfer shaft in an identical manner as explained for vertical movement but upward movement of slide Z rocks horizontal bellcrank X. The movement of horizontal bellcrank X pulls links V downward, which rock directional levers S and T. Through shift lever W engaged over the stud of lever S or T, type box carrier O is moved to right or left position.

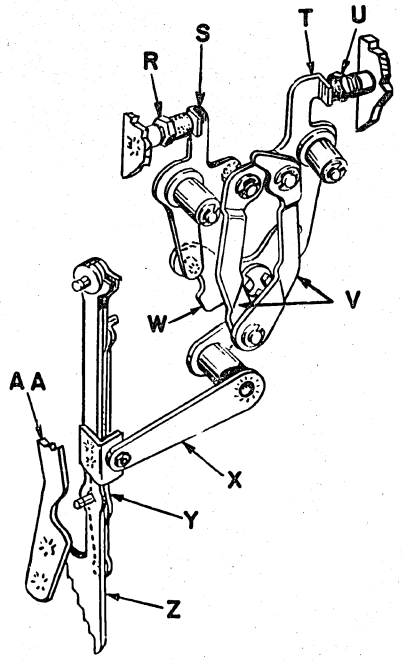


Fig. II-33

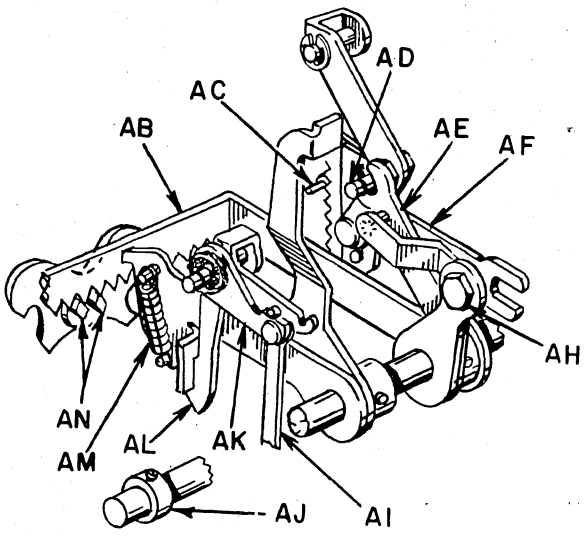


Fig. II-34

DETENTING THE TYPE BOX

As the type box is being positioned, hammer restoring link AI is moved upward from the power transfer shaft. At approximately 180° in rotation of the typewriter camshaft, arm AK rocks primary latch AL clear of (horizontal) detent bail AB. This permits the detent bail, driven by spring AM, to engage diamond shaped studs AN and hold the type box in its horizontal position during printing. Simultaneously, through arm AE vertical detent AF moves rearward to engage vertical detent stud AC, and holds the type box in its vertical position.

PRINTING THE CHARACTER

In the downward travel of type box detent AB, arm AS through lever AQ rocks hammer latch AR clear of the step on printing hammer AT. Driven by spring AU, the printing hammer swings rearward striking interposer AP which, through firing pin AO drives the type rearward to print the selected character. Hammer AT then strikes the bail of secondary latch AX rocking its forward arm up to release lever AV of horizontal detent bail AB.

Disengagement of the type box detents occurs when secondary latch AX is raised. Lever AV moves forward a short distance from the tension of spring AM and horizontal detent AB moves from tension of hammer latch spring AY, until primary latch AL is in latching position.

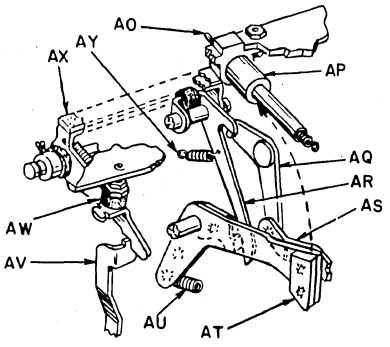


Fig. II-35

RESTORING THE WRITER SECTION

The sequential restoring movement of the mechanisms associated with the writer section permits early restoring of the typewriter keys and prevents interference with other mechanisms being restored.

The code actuating slides are fully restored from cam No. 6 at 190° and the keyboard cycle bail is restored at 197° from cam No. 1. This permits the depressed keystem to restore and the next character to be indexed prior to the completion of the typewriter camshaft cycle. The code stops are held in indexed position until late in the cycle (approximately 340°) to prevent interference with restoring of the toggle links.

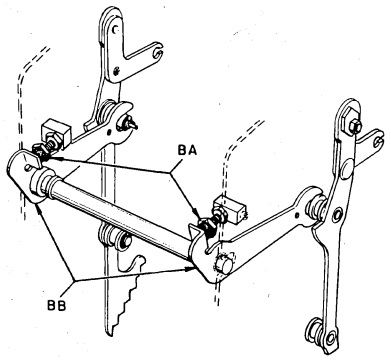


Fig. II-37

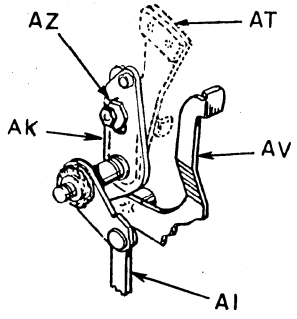


Fig. II-36

The power transfer shaft driven from cam No. 3 starts its restoring movement at approximately 280°. At this time, firing and restoring link AI moves downward restoring the printing hammer. The cam surface of hammer reset arm AK through the roll in lever AV resets the type box detents on primary latch AL and behind secondary latch AX.

Simultaneously the toggle lift arms move downward restoring the transport mechanism and the type box to normal. After the projections of the lift slides have passed the lowest code stops, the coding head driving bail is restored to normal by the roll in cam No. 4.

Restoring of the vertical lift slides to home position is cushioned by formed ears BB of the stabilizer bail contacting neoprene bumpers BA.

Tests and Adjustments

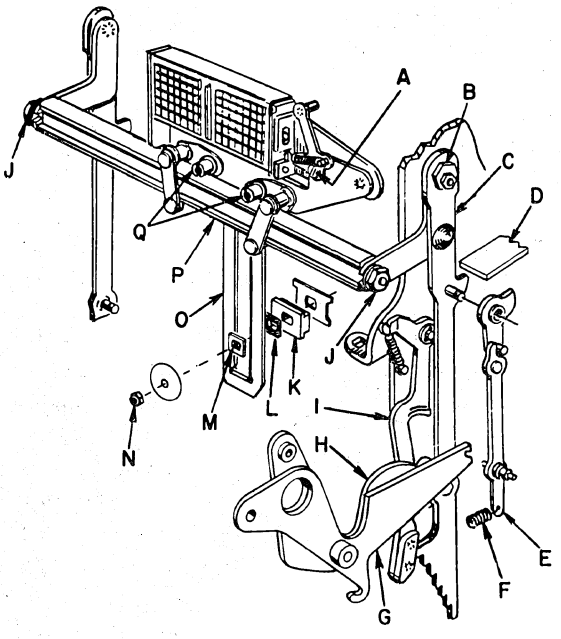


Fig. II-38

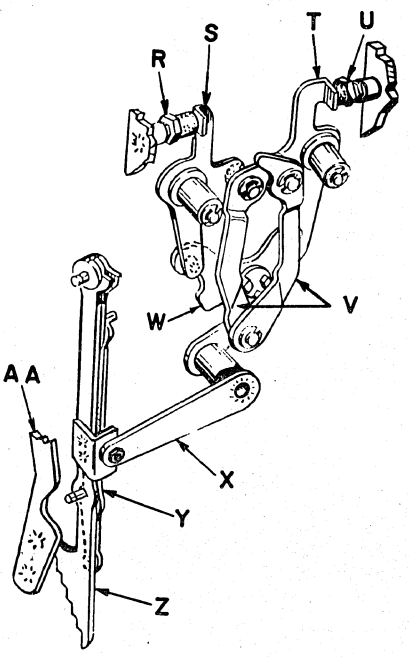


Fig. II-39

9 W5-1 Transport frame O should be free and snug on transport rail P and guide rails on back plate of writer shell.

TO ADJUST,

a. With stop nut N loose, position roller links as required and tighten slotted nuts Q.

b. Tighten stop nut N.

Note: Place shims L (.003") between slide guide bearings K and M as required.

REASON: To ensure snug but free movement of transport frame.

Note: Before making the following adjustments, front bumpers BA should be turned completely rearward to avoid false limit.

10 W5-2 With slight downward pressure on horizontal bellcrank X shift lever W should engage freely over the stud in either directional lever S or T.

TO ADJUST, turn bumpers R and U as required.

REASON: To establish the home position of horizontal transport mechanism and to permit selecting upper and lower case characters.

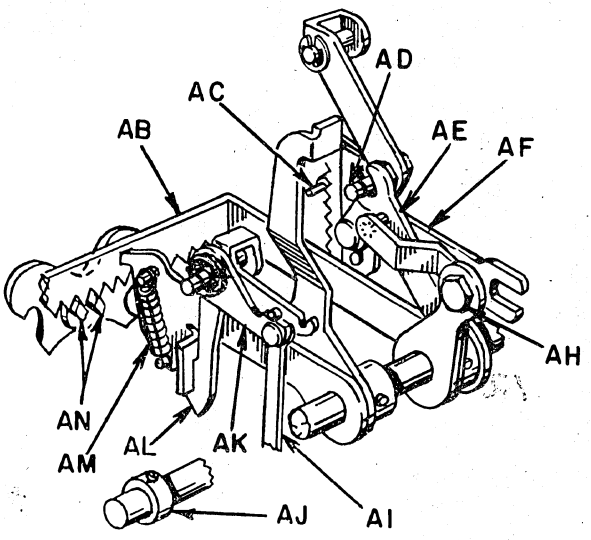


Fig. II-40

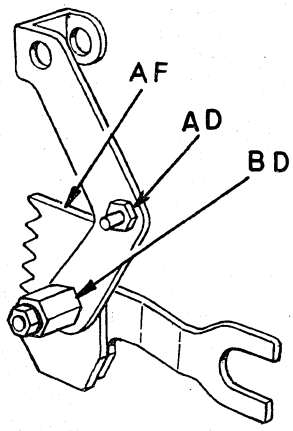


Fig. II-41

11

W5-4 With vertical lift slide C held upward against any code stop, detent stud AC should align centrally between any two teeth of vertical detent AF.

TO ADJUST,

a. Heavy duty writer section, turn eccentric BD to raise or lower vertical detents.

b. Early style writer section, raise or lower code stop assembly BF.

REASON: To align vertical detent with detent stud AC.

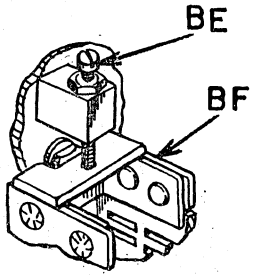


Fig. II-42

12

W5-5 With horizontal detent AB fully seated on diamond studs AN, stud AC should be fully seated between any two teeth of detent AF. This can be checked with type box moved to any code stop position, primary latch released and set collars AJ loosened if necessary. Both detents should be snug.

TO ADJUST, turn eccentric stud AD as required.

REASON: To ensure full depth mesh of vertical and horizontal detents.

13 W5-6 With horizontal lift slide Z held upward against any code stop, diamond shaped studs AN should locate at same relative position to teeth of bail AB for both upper and lower case movements.

TO ADJUST, move bail assembly AB laterally between the writer box side frames as required and tighten set collars AJ.

REASON: To ensure central location of bail assembly AB with respect to upper and lower case shift of type transport frame.

14 W5-7 With horizontal lift slide Z held upward against any code stop and free movement of transport frame O held in overthrow then underthrow position, the diamond studs AN should align equally with the teeth of bail AB.

TO ADJUST, turn eccentric in horizontal bellcrank X.

REASON: To equalize the throw of the diamond studs.

16 W5-8 With writer box normal, there should be .001" to .003" clearance between latch AR and stud in lever AQ.

TO ADJUST, turn eccentric AH.

REASON: To ensure full hold of latch AR on hammer AT when normal and to properly time the release of hammer AT.

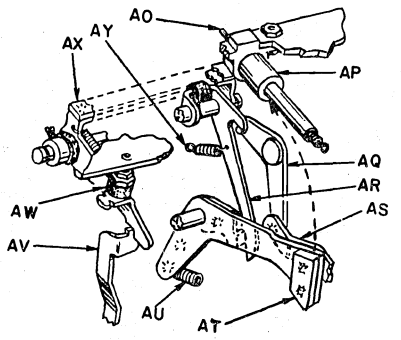


Fig. II-43

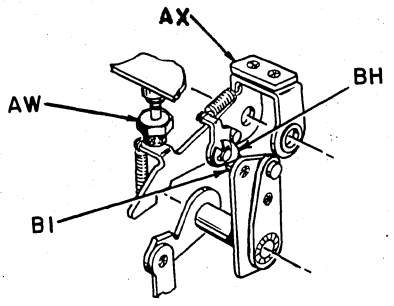


Fig. II-44

17 W5-9 During a restoring operation with roller BI located under high point of by-pass pawl BH, there should be .005" to .010" clearance between the ear of latch bail AX and bumper AW.

TO ADJUST, raise or lower bumper AW as required.

REASON: To prevent a possible bind of latch bail BG between roll BI and bumper AW and to prevent excessive overthrow of latch bail AX.

18 W5-10 With type box locking lever in locked position, there should be no side play of the type box in frame O.

TO ADJUST, turn eccentric A as required.

REASON: To maintain fixed position of type box in transport frame O.

19 W5-11 With the transport frame limited at any horizontal and vertical code stop position, firing pin AO should align centrally with the type.

TO ADJUST, Locate interposer AP laterally in top plate as required.

REASON: To centrally align firing pin with type.

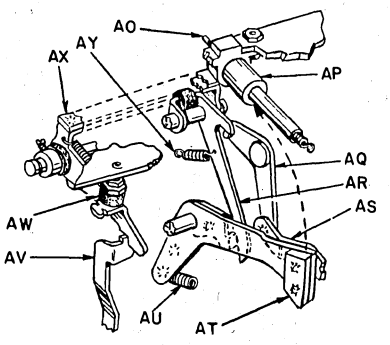


Fig. II-45

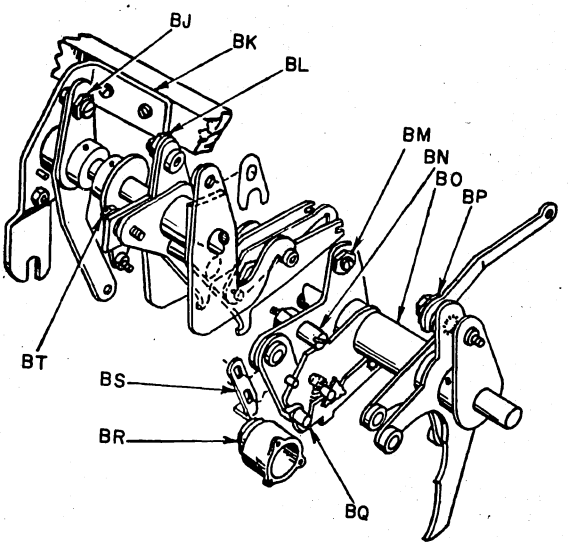


Fig. II-46

Power transfer shaft adjustments are sequential. When any adjustment is made, consideration of other adjustments effected should be made immediately to avoid straining writer section parts.

1 W5-13 The eccentrics on the power transfer shaft should be pre-set as follows.

TO ADJUST,

a. Eccentrics BJ, BL, BM and BP should be set with high point up.

b. Eccentric BT should be set with high point rearward.

REASON: To facilitate subsequent adjustments.

2 P3-1 There should be .001" to .003" lateral play of power transfer shaft.

TO ADJUST, locate support bracket BK on cross-bar as required.

REASON: To ensure correct location and free movement of power transfer shaft.

3 W5-12 Rollers on lift arms H should clear the writer box side frames and maintain no less than a 3/4 hold on rebound latches I and AA.

TO ADJUST, insert .003" or .004" shims between drive pawl arm and roll arm H.

REASON: To ensure a sufficient hold of rollers on rebound latches and clearance with side frames.

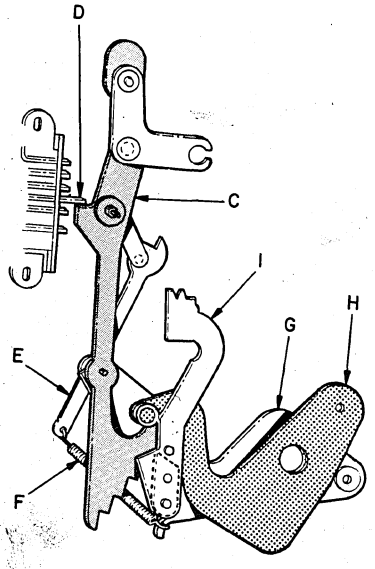


Fig. II-47

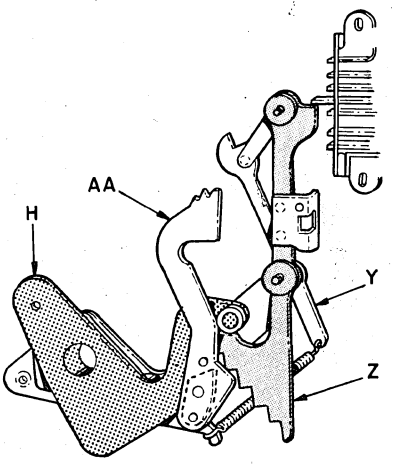


Fig. II-48

W5-14 There should be no less than .005" passing clearance between the pawls of toggle links E and Y and inactive code stops D.
TO ADJUST, turn eccentric BP as required.
REASON: To ensure selection of the correct code stop.

W5-15 With the typewriter camshaft in home position, drive pawl BQ should move freely under arm of bellcrank BO and have no more than .001" to .003" clearance.
TO ADJUST, turn eccentric screw BN as required.
REASON: To ensure immediate pick-up and full drive of power transfer shaft.
Note: When making this test, be sure limit plate BS is in uppermost position to avoid interference.

W5-16 Manually cycle the typewriter camshaft selecting any character, roll arm should raise rebound latch I to hold vertical lift slide C within .003" to .005" of the code stop.
TO ADJUST, turn eccentric BL forward.
REASON: To secure proper movement of vertical lift slide to the active code stop.

W5-17 Manually cycle the typewriter camshaft selecting any character, roll arm should raise rebound latch AA to hold horizontal lift slide Z within .003" to .005" of the code stop.
TO ADJUST, turn eccentric BM forward.
REASON: To secure proper movement of horizontal lift slide to the active code stop.

W5-18 With transport mechanism in home position, directional lever W should freely engage lower studs in horizontal shift arms S and T as in Test No. W5-2.
TO ADJUST, turn eccentric BT downward.
REASON: To ensure upper case shift of type box.

W5-19 With the (/) diagonal key depressed, manually cycle the typewriter camshaft until roll arms H are at the highest point of travel. At this point primary latch AL should release horizontal detent AB.
TO ADJUST, turn eccentric BJ forward and make Test No. W5-20.
REASON: To properly time release of type box detents AB and AF.

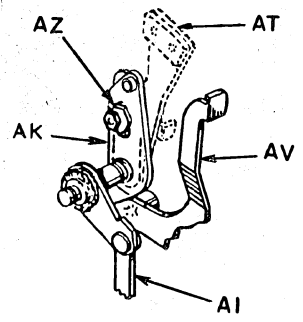


Fig. II-49

20

W5-20 With typewriter camshaft in home position, there should be .010" to .015" hammer reset lead beyond hammer latch AR. Check for slight upward movement of hammer at start of typing cycle.

TO ADJUST, turn eccentric AZ as required.

REASON: To ensure positive latching of hammer and clearance between hammer and hammer reset stud when hammer is in printing position.

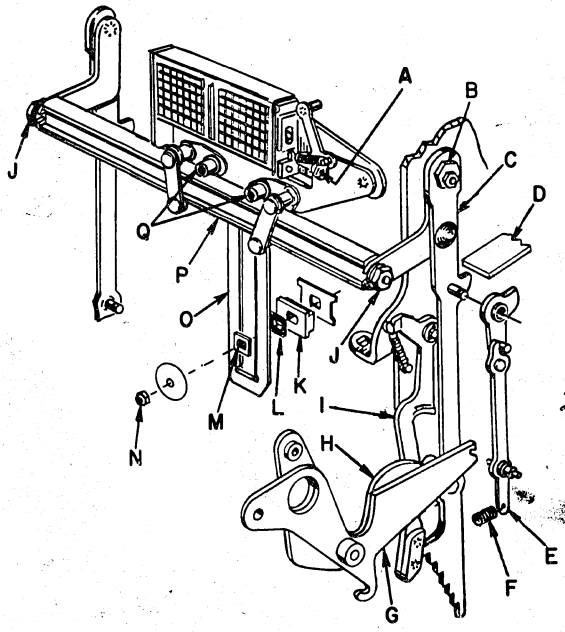


Fig. II-50

22

W5-21 Using Sensimatic print as a guide, the typing characters should print on the same horizontal line.

TO ADJUST, with nuts on ends of bail P loose, turn eccentrics B as required. When re-tightening nuts J, avoid creating a bind through bail P.

REASON: To ensure uniform print of typewriter and Sensimatic type.

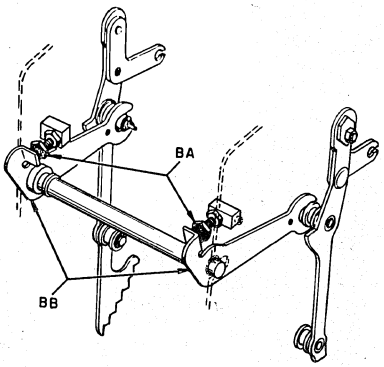


Fig. II-51

21

W5-22 With the typewriter camshaft normal, there should be .003" to .005" clearance between ears BB and bumpers BA.

TO ADJUST, turn bumpers as required.

REASON: To cushion the restoring of the vertical lift slides and to prevent bearings from bottoming in slots of writer box side frames.

23 W5-23 With power transfer shaft normal, there should be .005" to .010" clearance between limit plate BS and bearing hub BR.

TO ADJUST, position limit plate BS on pawl BQ as required.

REASON: To ensure restoration of typing camshaft to normal following typing space bar operations.

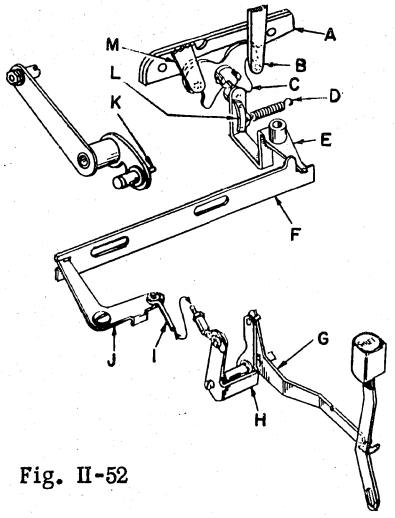


Fig. II-52

SHIFT KEY

Movement of the type box in a right or left direction is controlled by the position of shift lever C. Lever C when held in normal position by spring D, is engaged over the stud of left directional lever M. This causes the type box to be moved to the left by the transport mechanism to normally selected lower case type positions which are in the right side of the type box.

To select upper case characters, the "Shift" key on the typewriter keyboard is depressed. Depression of the keystem, through lever G, bail H, wire I and bellcrank J, moves slide F to the right. Movement of slide F, through shift bail E, rocks shift lever C to engage the stud in right directional lever B. Movement of the type box by the transport mechanism will then be to the right - to upper case type positions which are in the left side of the type box.

Guide plate A on the writer section frame maintains engagement of shift lever C with the stud of directional lever M or B during the typing cycle. Guideplate L on bail E and stud K in horizontal bellcrank prevent depression and restoring of the shift key during the typing cycle. When lower case type positions are selected, stud K moves parallel to left side of plate L to prevent depression of the shift key. When upper case type positions are selected, stud K moves parallel to right side of plate L and prevents restoring of shift lever C until the end of the typing cycle.

K6-6A With writer box normal, there should be .005" to .015" clearance between bellcrank J and slide F.

TO ADJUST, shorten or lengthen wire I through turnbuckle.

REASON: To ensure full indexing of shift lever C.

RIBBON LIFT AND RIBBON FEED

The ribbon lift shaft assembly provides the means of raising the ribbon to printing position and lowering the ribbon for visible alignment of forms. The roll arm on the power transfer shaft rocking upward raises the ribbon to black position, through the cam lever of the lift shaft. Lowering the ribbon to normal position is aided by the spring connecting the two shaft assemblies. The booster spring on the left ribbon post assembly assures restoring by overcoming drag caused by ribbon tension.

Ribbon feed for typewriter printing is driven from the left-most arm of the power transfer shaft. Ribbon feed for Sensimatic printing is driven from the left drive arm assembly which controls the adding racks. Movement from both sources use the same connecting link to actuate the ribbon feed slides. Since overlapping movement occurs, ribbon feed should be actuated from only one source at a time.

DRIVE TRIP INTERLOCKS

To prevent writer section printing - when the carriage is out of printing position; when the carriage is open; and during carriage movement - the power transfer shaft drive pawl C is moved out of the path of drive bellcrank D. As described earlier, the space bar also disables the writer section through code slide No. 7 to provide a space between words.

When the carriage is out of printing position (the first four inches of carriage movement) spring G through bail E holds control slide F rearward to prevent drive pawl C from engaging bellcrank D. As the carriage tabulates to the 4.1" position, the carriage gear rack rocks bail E. This permits spring B to move slide F forward and pawl C under bellcrank D - thereby enabling printing in all other carriage positions.

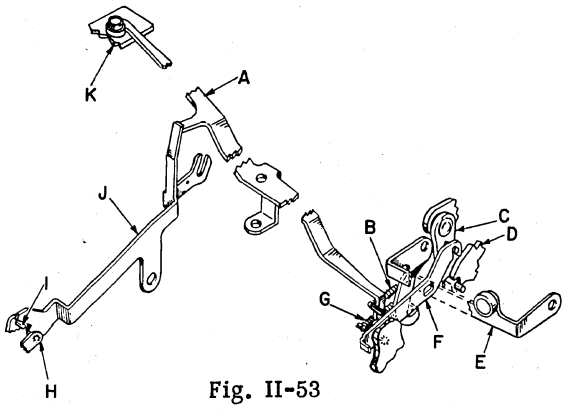


Fig. II-53

When the carriage opening slide K moves forward, opening the carriage, the forward roll rocks lever A. The formed ear on the left end of lever A moves control slide F rearward to disable drive pawl C.

When carriage movement is indexed, stud H or I rocks lever J from the tab or the return paddle shaft. The upper arm of lever J rocks lever A to move slide F rearward to disable drive pawl C. Printing is thus prevented until the paddle shaft is released by the selected carriage stop.

Tests and Adjustments

C34-33 With both paddle shafts in normal position, the rear extension of interlock lever J should have simultaneous contact with stud H and stud I.
TO ADJUST, bend rear extension of interlock lever J at off-set.
REASON: To ensure full movement of interlock lever J from the tab paddle shaft and the return paddle shaft.

P26-1 With the tab and return paddle shaft at normal, there should be .005" to .010" passing clearance of Sensimatic drive trip interlock O and formed ear of drive trip lever N.
TO ADJUST, bend forked extension of lever J at its off-set as required.
REASON: To prevent tripping the drive during carriage tabulation and return functions.

P26-2 With the carriage fully open, there should be .005" to .010" clearance between interlock actuating lever A and stud in slide F.
TO ADJUST, bend lever A.
REASON: To prevent typewriter operation while the carriage is open.

P26-3 With a tab or return function indexed, there should be .003" to .005" clearance between flat projection of lever A and the upper arm of lever J.
TO ADJUST, bend arm of lever J as required.
REASON: To prevent typewriter operation while a tab or return function is active.

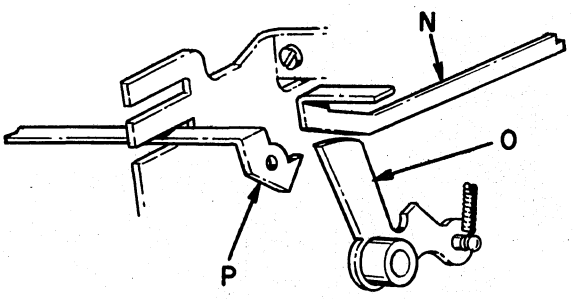


Fig. II-54

P26-6 With the carriage out of a stop position and the machine drive tripped, and drive trip arm N limiting on top of interlock O, latch P should move under drive trip arm N with at least a half bold. When drive trip arm N is held in this position by latch P, interlock O should be free to move under drive trip arm N.
TO ADJUST, bend latch P up or down as required.
REASON: To prevent operating the machine when the carriage is out of a stop position.

C34-38 With carriage opening operation indexed and completed, visually check for .030" to .060" clearance between lever A and the shoulder of roller or slide K.
TO ADJUST, bend lever A up or down as required.
REASON: To prevent binding lever A when slide K is completely forward.

C34-39 Spear point interlock should locate centrally between tab and return stop latches.
TO ADJUST, weave spear point of interlock as required.
REASON: To ensure full throw of spear point interlock when stop dogs are located centrally between stop latches.

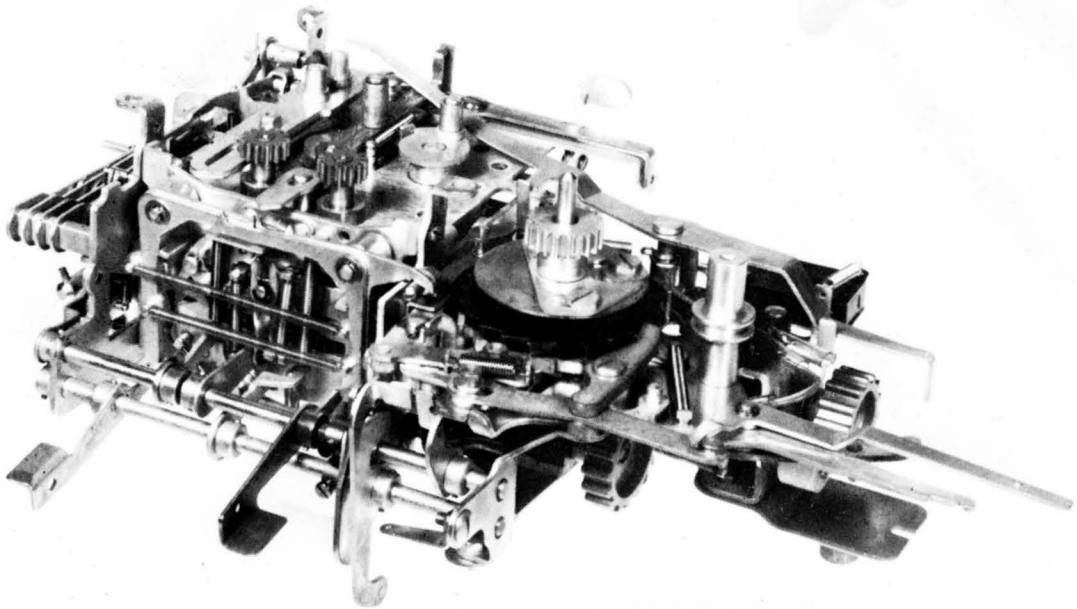


Fig. II-55

CARRIAGE MOVEMENT

Carriage tabulation and return movements incorporated in design of the Typing Sensimatic enable programming to nearly any accounting application. The carriage drive unit and escapement section provide the central control for all movements. The construction of the carriage drive unit is similar to the gear box of the basic Sensimatic. Differences in construction and function will be described under headings of Escapement, Sensimatic Tabulation and Return, and Typewriter Tabulation and Return.

Since typing requires instantaneous .1" carriage movement, the carriage is positioned by escapement pawls and the escapement gear. The tab clutch of the carriage drive unit is normally engaged, and power from the constant running motor is provided through the magnetic clutch. To tabulate and return the escapement pawls are disengaged from the escapement gear. This is accomplished by rocking the tab or the return paddle shaft. Carriage stop latches on the gear box back plate hold the paddle shafts in latched position until released by the stop dog in the desired carriage position. Skip latches on the sensing unit also hold the paddle shafts in latched position for selective movements. Therefore, all carriage movements are latch controlled.

To vertically space posting forms at any time, a separate drive shaft provides continuous power to the form space clutch and the carriage open and close clutch. Synchronizing of automatic carriage closing with Sensimatic printing is provided by the timing belts.

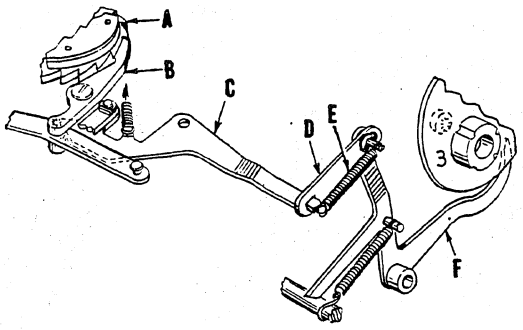


Fig. II-56

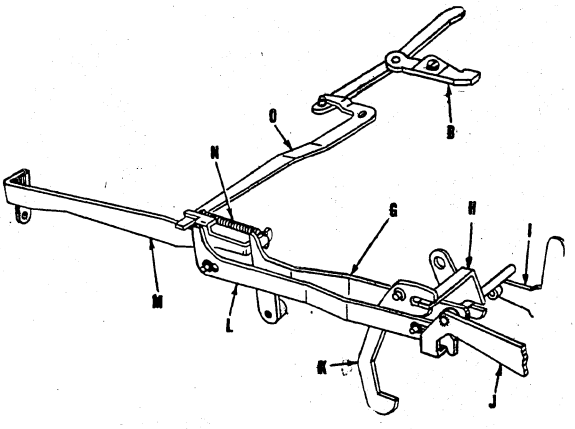


Fig. II-57

ESCAPEMENT

Carriage escapement is the means of automatically tabulating the carriage .1" each typewriter cycle. Since the carriage is positioned against the tab escapement pawl by power from the magnetic clutch, escapement is provided by momentarily disengaging the tab pawl and applying "full power" to the magnetic clutch.

At approximately 200° of typewriter camshaft rotation, the roll in cam No. 3 rocks bellcrank F, which through the tension of spring E rocks escapement lever C. The cam surface on the right end of lever C drives tab pawl B out of the tooth space of gear A.

Pawl B is held disengaged until approximately 300° of camshaft rotation, at which time lever F and lever C are restored to normal by spring tension. Magnetic clutch "full power", through the carriage drive unit tab clutch moves the carriage .1" - until pawl B limits against the next tooth of gear A.

FULL POWER FOR CARRIAGE MOVEMENT

Switch No. 7, which controls the "full power" circuit to the magnetic clutch, is actuated from three sources; the ribbon lift shaft, cam No. 4, and the tab escapement pawl.

Lever J on the ribbon lift shaft, rocking downward, cams slide L rearward. Through lever O and spring N, slide M is moved rearward to actuate switch No. 7. This provides "initial full power" in advance of carriage movements that are indexed from a Sensimatic machine operation.

On any typewriter camshaft cycle, whether the ribbon is lifted or not, the rotation of cam No. 4 raises lever I. Through its long stud, lever G is rocked to drive slide M rearward and actuate switch No. 7.

When either direction key is used, tab pawl B is disengaged from the escapement gear. This movement rocks lever O, which through spring N moves lever M rearward to actuate switch No. 7. Switch No. 7 is held in closed position, through slide M, spring N and lever O by the disengaged tab pawl B to provide "extended full power" for completion of all carriage movements.

Tests and Adjustments

P22-1-1 There should be .025" to .035" rearward movement of slide M after contacts of switch (S-7) have been transferred to full power.
TO ADJUST, bend rear formed ear of slide M as required.
REASON: To ensure safe switch contact for full power of carriage drive clutch.

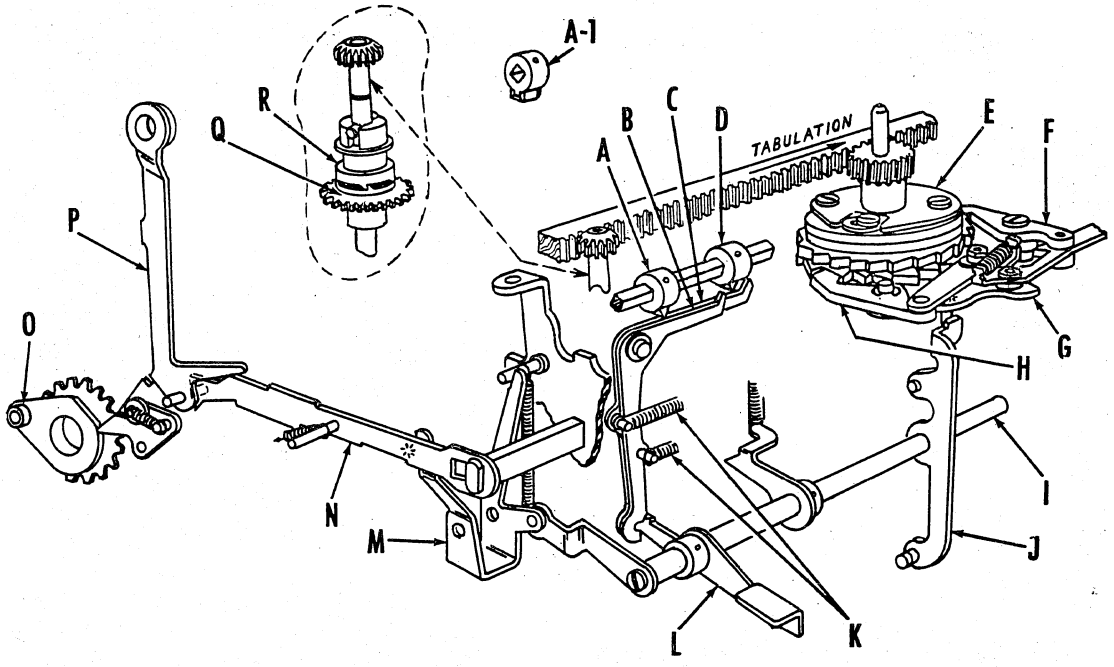


Fig. II-58

SENSIMATIC TABULATION AND RETURN

Sensimatic tabulation and return are those movements which are indexed manually from depression of the directional keys and automatically from rotation of the Sensimatic main camshaft. The method of indexing tabulation, return, and selective (skip) return, and selective (skip) tab or return from motor bars and carriage controls is identical to those for Series F100 through F500, but mechanical function and placement of controls differ slightly.

TABULATION

Tabulation is the automatic movement of the carriage to the left one consecutive stop position at a time.

At approximately 192° in rotation of the main camshaft, roll O rocks kicker arm P to move control slide N rearward, which through bellcrank M rocks tab paddle shaft assembly I. Lever J on the paddle shaft rocks pivot lever G to disengage escapement pawls F and H from escapement gear E - thus permitting the carriage to move. Primary latch C and carriage stop latch B rock over the forward arm of paddle L from tension of springs K. Primary latch C, which is longer, holds the paddle shaft assembly. Since tab clutch members R and Q are engaged, "full power" from the magnetic clutch moves the carriage from the stop position to the left.

After moving .3", outgoing stop D cams primary latch C clear of paddle arm L. The paddle shaft restores slightly but is held by carriage stop latch B for the remainder of the carriage movement to the next stop position.

When the carriage is approximately .050" from the stop position, incoming stop A rocks carriage stop latch B clear of paddle L permitting paddle shaft I to restore from spring tension and permitting the escapement pawls to stop the carriage through escapement gear E. Overthrow and rebound of the carriage is absorbed by the bonded rubber construction of the escapement gear.

One tenth inch tabulation is possible due to pass-by pawl construction of kicker arm P and due to primary latch C being disabled from depression of carriage stop latch B. When roll O of the Sensimatic camshaft rocks paddle shaft I to latch position to disengage escapement pawls F and H, the pass-by pawl drops off roll O. Kicker arm P and control slide N restore to normal. Incoming stop A - when located .1", .2", or .3" from outgoing stop D - rocks carriage stop latch B. Through its spring anchor stud, primary latch C is also rocked clear of paddle L. Thus the paddle shaft immediately restores to normal, and escapement pawls F and H stop the carriage. 1/10 inch tab stops A-1, which have a land surface instead of a knife edge, prevent latches B and C from latching the paddle shaft thereby providing one or more consecutive .1" carriage tabulations.

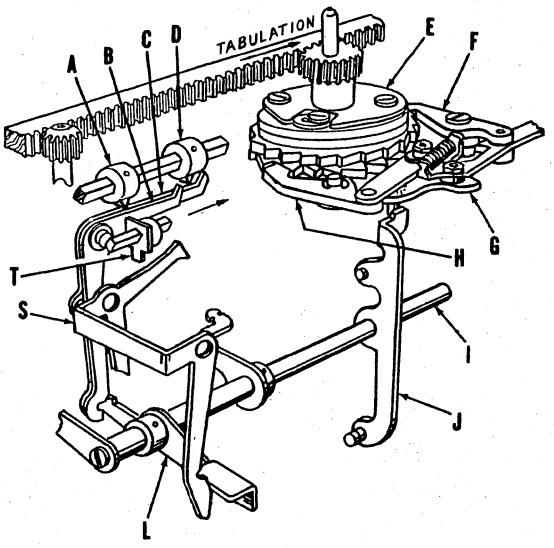


Fig. II-59

SELECTIVE TABULATION

Selective (skip) tabulation is the automatic movement of the carriage to a pre-determined or "selected" stop position. Machine controls and motor bars used to index skip movements in lanes 1, 3, and 4 on the Series F1000 machines are the same as those used on Series F100 through F500 machines.

As explained for "tabulation", the primary stop latch holds the paddle shaft in latch position for .3" of carriage travel. The outgoing stop then releases the primary latch, and the paddle shaft restores slightly to be held by skip latch S. During "skip" movement carriage stop latch idles over intervening stops and is not active until skip latch S is released by the long projection of release disc T. The paddle shaft then restores slightly and is held by carriage stop latch B. When the carriage is approximately .050" from the selected stop position, incoming stop A releases the paddle shaft to restore. The escapement pawls engage the teeth of the escapement gear and stop the carriage.

Primary latch C holds paddle L at its highest latch position to permit skip latch S to move freely under the formed ear of paddle L. An "overlapping skip" application, which will be described later, requires the release disc to interfere with skip latch S moving under paddle L at the start of a carriage movement. Since the apex of primary latch C is .4" from the apex of carriage stop latch B, primary latch C provides control for .3" of carriage movement to enable skip latch S to reset under the formed ear of paddle L.

RETURN AND SELECTIVE RETURN

Carriage movement in the return direction (to the right) is indexed automatically on a Sensimatic machine cycle in a similar manner as described for "tabulation". Selective (skip) returns, provided by skip latches for control lanes 2 and 5, also function similar to selective tabulation. To "return" the carriage, the tabulation clutch is disengaged and the return clutch is engaged.

Return paddle shaft AB is rocked to latch position from rotation of the Sensimatic main camshaft in a similar manner as described for the tab paddle shaft. This moves lever X forward to disengage the escapement pawls, through pivot lever G, and lowers arm AC. Lowering of arm AC rocks the vertical step of return latch Z clear of formed ear of clutch control lever W. Spring AJ, pulling

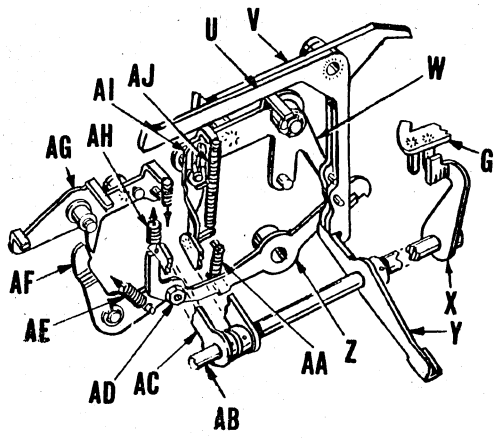


Fig. II-60

downward, engages the return clutch. Simultaneously through eccentric AD and disengaging lever AF, tab clutch control lever AG is rocked upward to disengage the tab clutch. Spring AE rocks toggle link AM past center. The formed ear of toggle link AM moves out from under pawl AL and weight arm AK swings downward - positioning pawl AL in the path of formed ear of toggle lever AM. Sequential or simultaneous movement will be noted. Carriage stop latch V rocks over paddle Y; the return clutch engages; toggle lever AM moves past center; and primary latch U rocks over paddle Y.

Restoring to normal of the return clutch and the tab clutch occurs when the incoming carriage stop rocks carriage stop latch V clear of the return paddle. Spring AH, pulling upward, restores paddle shaft assembly AB which through link AI rocks clutch control lever W to disengage the return clutch. When the formed ear of lever W clears the step of latch Z, spring AA rocks latch Z and through disengaging lever AF restores toggle link AM past center to permit the toggle to fold and the tab clutch to engage.

The delay timer delays engagement of the tab clutch to permit momentum of the carriage to complete the return movement, so that the escapement pawls will engage the proper tooth of the escapement gear. Weight arm AK delays folding of toggle link AM through pawls AL being located in the path of the toggle formed ear. Weight arm AK is rocked upward from tension of spring AA, and tab control lever AG moving downward engages the tab clutch from spring tension.

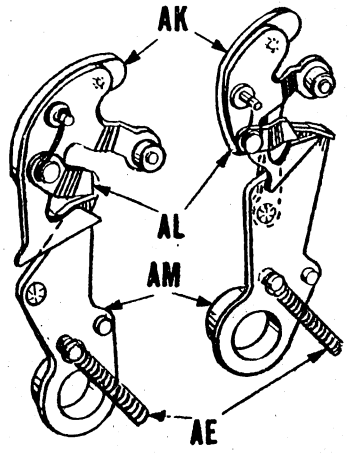


Fig. II-61

Selective return movements function in a similar manner as described for selective (skip) tabulation. Skip latches in lanes 2 and 5 hold the return paddle shaft in latched position until released by the long projection of a release disk in the lane of control. The next incoming stop releases the carriage stop latch which permits the paddle shaft to restore and permits the escapement pawls to stop the carriage through the escapement gear.

Directional keys for tabulation and return enable the operator to move the carriage into the end position for changing schedules and enable selection of stop positions to start a posting sequence. Since the instant of manual release controls selection of the stop position, stops located close together are difficult to select accurately and consistently.

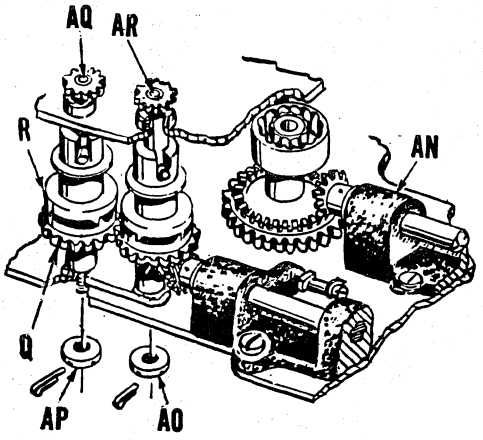


Fig. II-62

Tests and Adjustments

C34-1 The form space drive shaft and the clutch shaft should turn freely with maximum depth mesh of the bevel gears.
TO ADJUST, insert .006" shims under casting AN.
REASON: To have a free running shaft and maximum depth mesh of bevel gears.

C34-2 There should be .003" to .010" vertical play of shaft AQ.
TO ADJUST, turn castle nut AP.
REASON: To have free running shaft AQ and to maintain correct location of gear Q.

C34-3 There should be .003" to .010" vertical play of shaft AR.
TO ADJUST, turn castle nut AO.
REASON: To have maximum depth mesh consistent with free running bevel gears.

C34-14 There should be .001" to .003" end play of the paddle shafts.
TO ADJUST, locate the set collars on the paddle shafts as required with set screws facing to the rear and downward.
REASON: To ensure freedom of paddle shafts with a minimum of side play so that skip and stop latch height adjustments will be maintained.

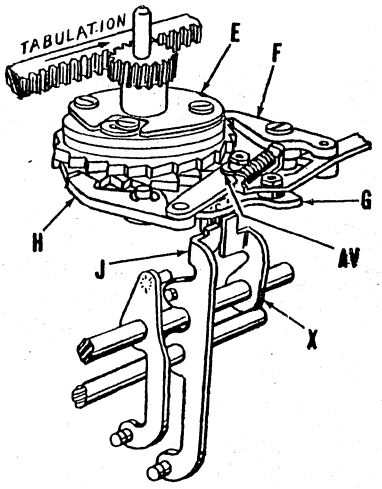


Fig. II-63

NOTE: With paddle shafts normal, bend ears of arms J and X for clearance not to exceed .005" between ears of levers and the two studs in tab and return actuator G. Final adjustment for this test will be made in Test C34-32. (Back space mechanism.)

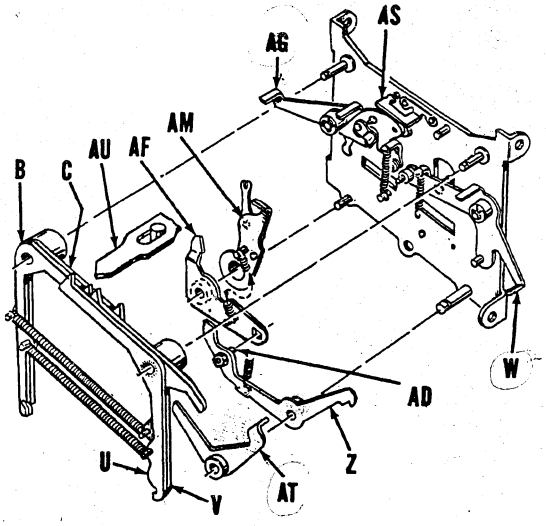


Fig. II-64

C34-15 With the right ear of tab clutch arm AG limiting on gear box post and eccentric AD set with high side up and paddle shafts normal, there should be .002" to .010" depth clearance between tab clutch members R and Q.
TO ADJUST, bend right ear of tab clutch arm AG.
REASON: To ensure positive hold on tab clutch members and correct location of tab clutch arm AG.

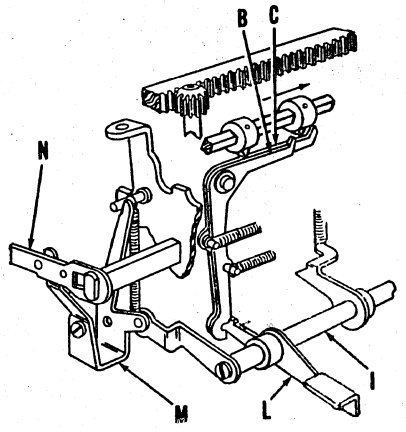


Fig. II-65

C34-15A With return slide N and tab slide (similar to N) moved to their points of maximum rearward travel, there should be .005" to .015" clearance between primary latches C and U and spring anchor AS.
TO ADJUST, weave spring anchor as required.
REASON: To prevent false limit of primary latches when tab and return slides are moved to point of maximum rearward travel from kicker arm assembly.

C34-17A With carriage normalizing lever forward depress motor bar No. 2. Manually cycle machine until tab slide N reaches its point of maximum travel, there should be .010" go and .021" no go latching lead of the tab paddle arm beyond the latching surface of primary tab latch C.
TO ADJUST, bend right arm of tab bellcrank M.
REASON: To ensure latching tab paddle assembly on primary latch C.

C34-17B With carriage normalizing lever forward, depress motor bar No. 1. Manually cycle machine until return slide (similar to N) reaches its point of maximum rearward travel, there should be .015" go and .026" no go latching lead of the return paddle arm beyond the latching surface of primary return latch U.
TO ADJUST, bend right arm of return bellcrank (similar to M).
REASON: To ensure latching return paddle assembly on primary latch U.

C34-18 With left arm of return bellcrank (similar to M) limiting against the spring anchor stud, there should be .001" to .003" clearance between right arm of return bellcrank (similar to M) and stud in return control slide (similar to N).
TO ADJUST, bend left arm of return bellcrank (similar to M). Maintaining .015" go and .026" no go latching lead of return paddle beyond primary latch.
REASON: To ensure free movement of return control slide (similar to N) and to establish the normal position of paddle shaft AB.

C34-19 With left arm of tab bellcrank M limiting against the spring anchor stud, there should be .001" to .003" clearance between right arm of tab bellcrank M and stud in tab control slide N.
TO ADJUST, bend left arm of tab bellcrank M, maintaining .010" go and .021" no go latching lead of the tab paddle beyond primary latch.
REASON: To ensure free movement of tab control slide and to establish the normal position of paddle shaft I.

C34-20 With return bellcrank (similar to M) against its limit stud, there should be .003" to .005" latching lead of return clutch arm W under the lower step of latch Z.
TO ADJUST, weave lower arm of arm W.
REASON: To ensure engagement of tab clutch in timing with disengagement of return clutch.

C34-21 With tab paddle L held by carriage stop latch B, there should be .003" to .005" clearance between formed ear of lever AT and stud in return clutch arm W.
TO ADJUST, bend the formed ear of lever AT.
REASON: To ensure that return clutch is disengaged before tab clutch is engaged.

C34-22 With tab paddle L held by stop latch B, the apex of latch B should be .104" to .114" above the latch hubs.
TO ADJUST, bend forward arm of tab paddle right or left.
REASON: To establish height of tab stop latch B for timing the release of escapement pawls.

C34-23 With tab paddle L held by primary latch C, the apex of latch C should be .104" to .114" above the latch hubs.
TO ADJUST, bend upper arm of primary latch C.
REASON: To establish height of primary latch C for proper functioning on overlapping skip applications.

C34-24 With return paddle Y held by stop latch V, the apex of latch V should be .104" to .114" above the latch hubs.
TO ADJUST, bend forward arm of return paddle right or left.
REASON: To establish height of return stop latch V for timing the release of escapement pawls.

C34-25 With return paddle Y held by primary latch U, the apex of latch U should be .104" to .114" above the latch hubs.
TO ADJUST, bend upper arm of primary latch U.
REASON: To establish height of primary latch U for proper functioning on overlapping skip applications.

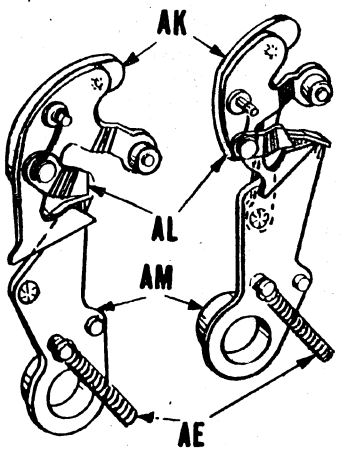


Fig. II-67

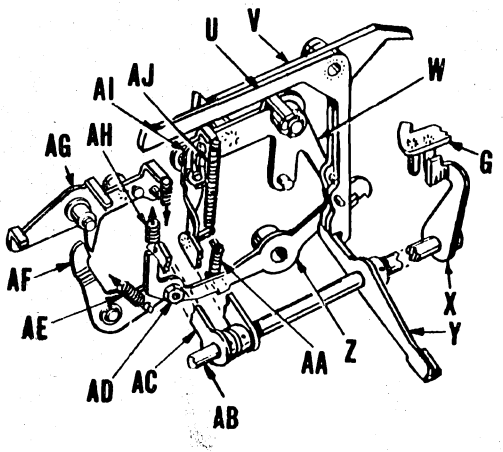


Fig. II-66

C34-26 When manually indexing a return operation, weight arm AK should drop past center after stop latch V latches return paddle Y and before primary latch U latches return paddle Y.
Clearance should be maintained between arm of lever AF and tail of tab clutch arm AG when gear box is normal.
Also check for slight movement of arm AG when return slide (similar to N) is .040" from maximum rearward travel.
TO ADJUST, turn eccentric AD as required.
REASON: To ensure that tab clutch delay timer is indexed to active position when return slide (similar to N) is indexed from kicker arm.

C34-27 With return paddle shaft AB held by primary latch U, there should be .001" to .003" clearance between tab stop latch B and upper formed ear of tab control lever AG.
TO ADJUST, bend upper formed ear of lever AG.
REASON: To prevent tab paddle from latching during simultaneous release of the directional keys.

C34-28 With return paddle shaft AB held by return stop latch V, there should be .003" to .005" clearance between return stop latch V and upper ear of return clutch control arm W.
TO ADJUST, bend upper formed ear of control lever W.
REASON: To prevent return paddle from latching during a simultaneous release of the directional keys.

C6-12 With return paddle Y held in its raised position by one of the return latches, the step of primary latch U should not locate over forward extension of return paddle Y, and the step of return stop latch V should locate over forward extension of return paddle Y.
TO ADJUST, bend ear of return paddle Y up or down.
REASON: To ensure proper functioning of return primary and stop latches U and V.

C6-13 With tab paddle L held in its raised position by one of the skip latches, the step of primary latch C should not locate over forward extension of tab paddle L, and the step of tab stop latch B should locate over forward extension of tab paddle L.
TO ADJUST, bend ear of tab paddle L up of down.
REASON: To ensure proper functioning of tab primary and stop latches B and C.

C6-14 With skip and return latches indexed individually, the apex of the latches should be from .257" to .264" above the tappets.
TO ADJUST, weave paddles to raise or lower skip and return latches.
NOTE: Latches must maintain a full hold on paddles.
REASON: To ensure that a long projection on release disk T will release the skip and return latches from the paddles and that a short projection on a set up disk will not release the latches.

TYPEWRITER TABULATION AND RETURN

Carriage movements of tabulation and return that are controlled from the typewriter mechanism provide the means of repositioning the carriage for a Sensimatic machine operation after typing. (The carriage drive unit spear point interlock prevents Sensimatic drive trip unless the carriage is in a stop position.) These selective movements are indexed from carriage control keys No. 1, No. 2, No. 3 and No. 4 on the typewriter keyboard; actuated from rotation of the typewriter camshaft; and terminated from release discs on the panel typewriter disc shaft in conjunction with stops on the stop shaft. Index of the carriage control keys was described in "KEYBOARD" section and wiring of the four switches was described in "POWER ELECTRICAL".

ACTUATING THE TYPEWRITER TAB AND RETURN SHAFT

Depression of any of the carriage control keys actuates switch No. 1 which closes the circuit through solenoid No. 5. Magnetic pull on the plunger, connected to the guide link and guide stud, raises drive link B to engage its vertical slot with the stud in cam No. 5 follower arm A. When thus connected, rotation of the typewriter camshaft rocks typewriter tab and return shaft D.

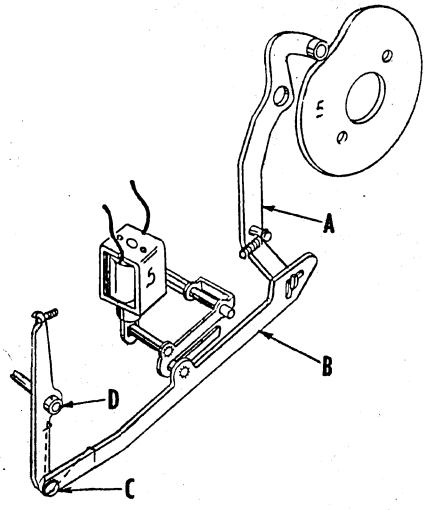


Fig. II-68

Test and Adjustment

C6-27 With cam No. 5 and shaft D in normal position, the vertical slot in drive link B should align centrally with the stud in follower arm A.
TO ADJUST, turn eccentric C.
REASON: To ensure engagement of cam No. 5 follower arm A with vertical slot of link B.

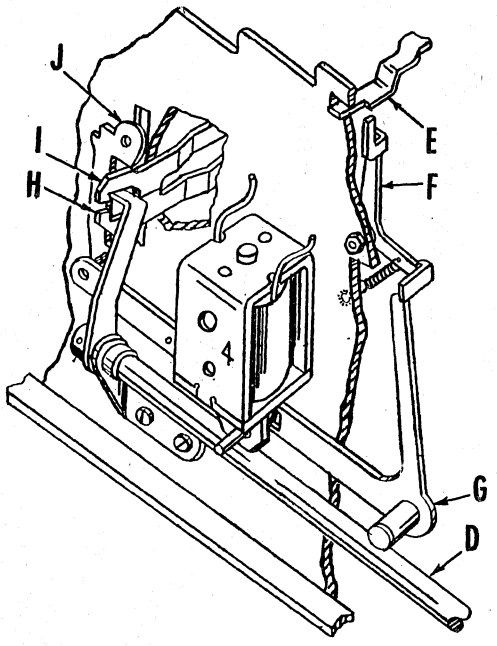


Fig. II-69

The skid control in Lane 26 provides the means of partially or fully blocking the selective function of solenoid No. 4 - thereby disabling tabulation, normally indexed, or converting lane 27 tabulation index into lane 30 return. When the carriage moves into a stop position which has a long projection in lane 26, disk L cams skid M downward until offset finger K aligns with the lower step of control slide J. Actuation of solenoid No. 4 moves slide J only half way up. This locates hook links H and I so that neither link will be active - which disables tabulation. When the carriage is .1" past the stop position which has a long projection in lane 26, disk L cams skid M downward until offset finger K aligns with the upper step of slide J. This prevents slide J moving upward from actuation of solenoid No. 4 and a return movement will occur.

SOLENOID NO. 4 SELECTS TABULATION

Extending through the sensing unit back plate and control slide J are two hook links. Upper hook link I attached to the return paddle shaft and lower hook link H attached to the tab paddle shaft provide the means of indexing carriage movement from typewriter tab and return shaft D. The position of links H and I is controlled by slide J and solenoid No. 4. When control slide J is in lower position (normal) carriage return movement will be indexed from shaft D. Solenoid No. 4, energized from closing of switch No. 4 contacts, raises hook link H to active position through slide J and lever G.

Carriage escapement is prevented by formed ear of lever F. When control slide J is lifted out of normal position, lever F is rocked from upper arm of lever G to prevent rearward movement of escapement link E.

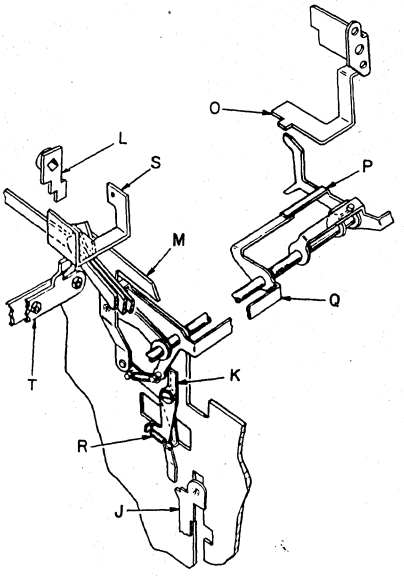


Fig. II-70

Tests and Adjustments

C6-22 With the long projection of disk L properly located on the incline of control skid M, offset finger K should align for a full hold on the lower step of control slide J.
TO ADJUST, bend offset finger K right or left.
REASON: To ensure disabling carriage movement from skid M.

C6-23 With finger K located in lower step of control slide J and control slide J manually raised, the drive arm of shaft D should move freely between the tab and return hook links H and I.
TO ADJUST, lengthen or shorten finger K at its offset.
REASON: To ensure disabling carriage movement from skid M.

C6-24 With control skid M fully depressed by long projection of disk L, finger K should move all the way into the top step of control slide J.
TO ADJUST, bend finger K right or left.
NOTE: After making this adjustment re-check Test No. 22.
REASON: To ensure a carriage return operation from lane 26 by holding control slide J in its lower position.

C6-25 With the carriage located at the extreme right position there should be .010" to .015" clearance between finger K and control slide J.
TO ADJUST, bend the forward long projection of bail Q.
REASON: To ensure indexing a carriage tabulation operation from typewriter carriage control key No. 4 with carriage in the extreme right position.

C6-26 The carriage escapement link E, when manually held to the left and moved rearward, should clear blocking bellcrank F by at least .003". With control slide J limited on its lower step, in the non-tab, non-return position, blocking bellcrank F should have a full hold on escapement link E.
TO ADJUST, bend lower ear of bellcrank F.
REASON: To ensure disabling carriage escapement when using the No. 4 typewriter carriage control key in conjunction with lane 26 control.

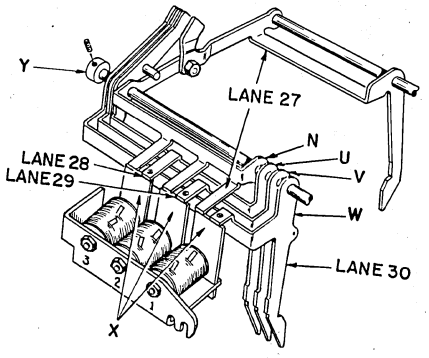


Fig. II-71

C6-28 With collar Y adjusted to take up end play, latches N, U, V, and W should be free and should align with their respective lanes in the disks of the control panel.
TO ADJUST, weave latches.
REASON: To permit correct carriage travel in indexed lanes.

C6-29 Latch N should clear limit blank T and latches U, V, and W should limit on blank T, when manually depressed.
TO ADJUST, position limit blank T and tighten screws.
REASON: To prevent clappers X from moving behind the studs on latches U, V, and W.

SELECTIVE TABULATION AND RETURN

Typewriter skip latches for lanes 27, 28, 29 and 30 enable selection of stop positions from typewriter carriage control keys to accommodate multiple line typing or Sensimatic accounting operations. Solenoids 1, 2 and 3 (numbered from front of the machine) hold the skip latches inactive through the solenoid clapper being normally located under the formed ear of the skip latch. Solenoid No. 1 controls tab skip latch for lane 27 and return latch for lane 30; solenoid No. 2 controls return latch for lane 29; and solenoid No. 3 controls return latch for lane 28.

Depression of typewriter carriage control key No. 1 (RET) actuates keyboard switches to close the circuit to solenoid No. 1. Magnetism pulls the clapper from under the formed ear of lane 30 skip latch to permit the lower arm of the latch to swing under the return paddle. The return movement thus indexed is released by a long projection release disk in conjunction with release of the carriage stop latch by the stop in the selected carriage position.

Since the other typewriter skip latches function in a similar manner, the chart below associates typewriter key index with the lanes of control effected.

Selective tabulation with carriage at right end position is provided from typewriter control key No. 4 through lane 27. In this position the controlling function of skid M, depressed by disabling bracket S and positioning offset finger K above upper step of slide J, is normalized. Offset finger K, through its upper projection and expansion of spring R, is rocked clear of slide J by limit bracket O, normalizing bail P, and lower rear projection of bail Q. Tabulation will then be indexed from key No. 4 through solenoid 4, slide J, and hook link H. A cutout in disabling bracket S permits lower arm of lane 27 skip latch to swing under the tab paddle and tabulation will occur until skip latch and carriage stop latch are released by a long projection release disc and a stop in the selected carriage position.

Tests and Adjustments

C6-18 With machine normal, there should be .120 to .130" clearance between the inactive projections of bail N and top of solenoid clappers X.
TO ADJUST, bend inactive projections of bail N.
REASON: To ensure clearance between inactive projections and rear case panel.

C6-19 With panel adjusted for correct clearance between control pins and sensing tappets and machine normal, there should be .030" to .035" clearance between the apexes of bails N, U, V, and W and the long projection of release disc L.
TO ADJUST, weave skip and return bails N, U, V, and W.
REASON: To ensure safe release of skip and return latches in lanes 27, 28, 20 and 30.

C6-20-21 With machine normal and bails N, U, V, and W limiting against the paddles, there should be .010" to .015" clearance between the active projections of the bails and the top of solenoid clappers X.
TO ADJUST, bend active projections of bails.
REASON: To ensure safe restoration clearance for solenoid clappers.

Key Depressed	Switches Actuated	Solenoid Energized	Lane of Control
1	3 & 4	1	30 RETURN
2	2	2	29 RETURN
3	3	3	28 RETURN
4	4	1 & 4	27 TAB
4 with full index of lane 26 skid --			30 TAB
4 with partial index of lane 26 skid --			NON-TAB NON-RETURN
4 with full index of lane 26 skid and carriage positioned to extreme right			27 TAB

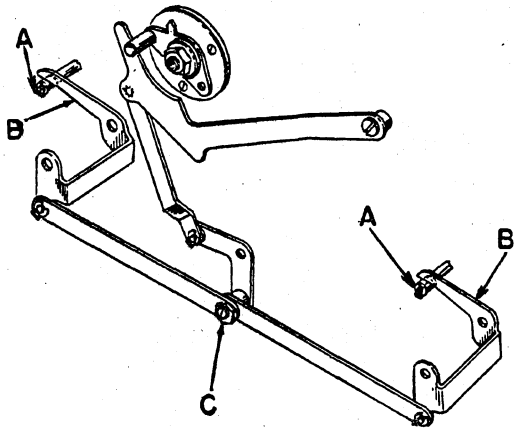


Fig. II-72

REGISTER SELECTION

Lengthening of the register selection shaft, the register overthrow limit shaft and the main camshaft was necessary to reach new bearing points in the auxiliary left sideframe. The register actuating rack and the register selection rack are mounted on the auxiliary left sideframe. This made necessary the re-design of timing controls to hold the selected register in active position. The register unit was not modified for the Series F1000 but a longer coupler is used to transfer motion from the register selection rack to the register worm assembly.

Tests and Adjustments

A10-13A With the machine normal, there should be simultaneous contact of bails B on rolls A in register "B" and "C".
TO ADJUST, weave bails B as required.
REASON: To ensure simultaneous control of register detent release hammer.

A10-13B With the machine manually operated until bails B receive their maximum throw, register detent release hammer should have .010" to .030" latching lead.
TO ADJUST, turn eccentric C as required.
REASON: To ensure latching of detent release hammers.

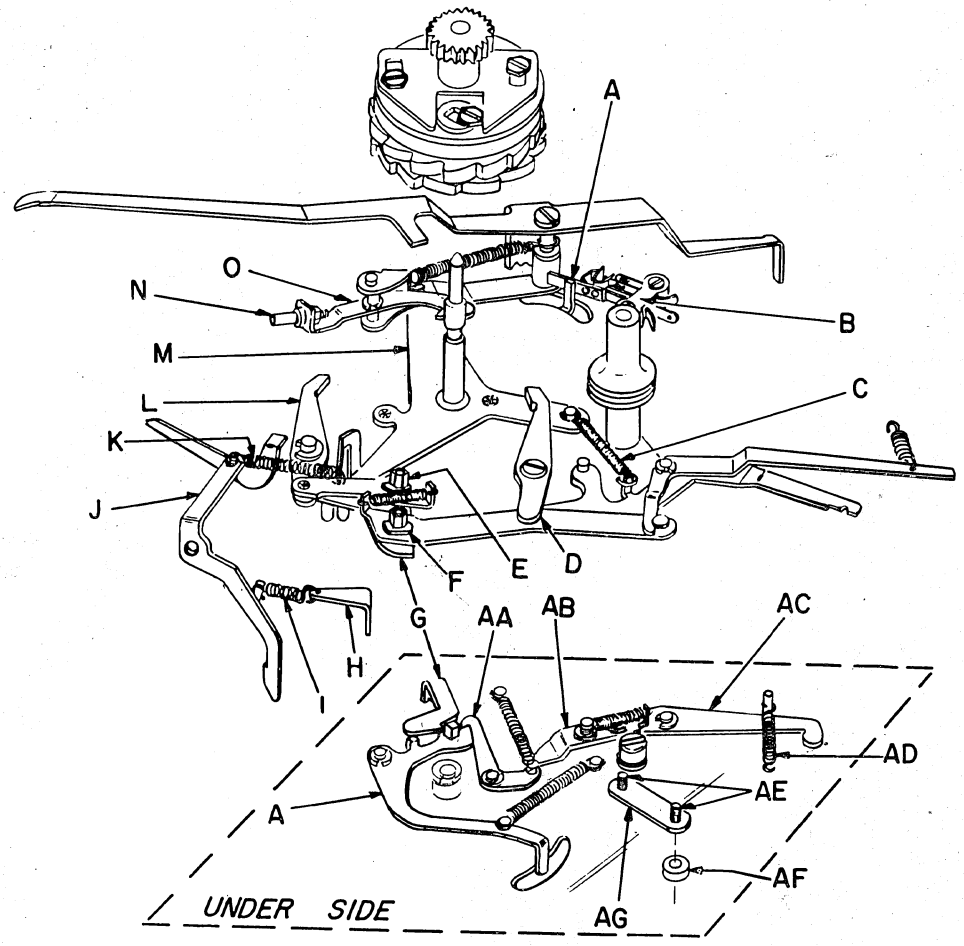


Fig. II-73

BACK SPACE MECHANISM

The improved back space mechanism provides the means of returning the carriage .1". The back space key indexes a basic carriage return operation from the typewriter camshaft and indexes mechanical linkage to disable the return after .1" of carriage movement.

The depression of the back space key indexes keyboard code slide No. 7 to disable printing and actuates lever AC through shaft assembly BB, wire BD, and bellcrank BE. Trip arm AB releases trip latch AA, to permit square stud in switch actuator A to engage step in tab and return actuator G, simultaneously allowing switch actuator A to close switch B which indexes carriage movement solenoid L5 and drive trip solenoid L6.

Tab and return actuator G rocks three prong back space control lever M through stud connection with switch actuator A, locating release pawl O in active position. Simultaneously, switch actuator A is reset on trip latch AA and the extended hook of tab and return actuator G moves into the path of formed ear of three prong back space control lever M to retain it in indexed position after square stud on switch actuator A is disengaged from the step on tab and return actuator G.

The rocking of three prong back space control lever M expands spring K sufficiently to overcome tension of spring I and to move back space auxiliary latch J under return paddle to hold return paddle shaft in indexed position until released by back space release pawl O.

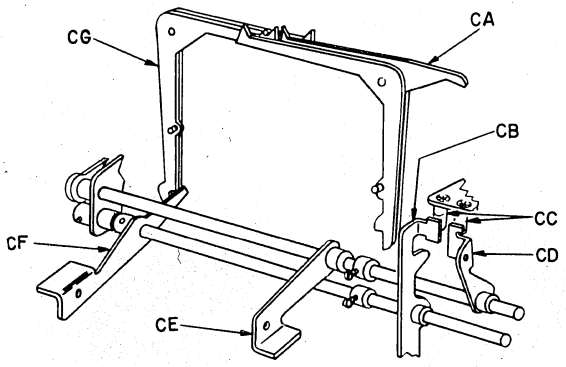


Fig. II-74

Tests and Adjustments

C34-32 With tab and return latches CB and CD normal, the tab and return actuator G must limit against the ear of the escapement unit plate and there should be clearance not to exceed .003" between studs CC in tab and return actuator G and formed ears of tab and return levers CB and CD.

TO ADJUST, bend ears of levers CB and CD as required.

REASON: To permit square stud in switch actuator A to engage the step of tab and return actuator G and to be in range of eccentrics E and F.

NOTE: The final adjustment for the amount of clearance between the ear of tab lever CB and stud will be made in Test 36.

C34-34 With tab and return actuator G limiting against ear of escapement unit plate, index lever AC. Trip arm AB should actuate latch AA releasing switch actuator A and allowing the square stud to engage the step of tab and return actuator G with a latching lead of .003" to .005".

TO ADJUST, bend formed arm of actuator G near off-set as required.

REASON: To ensure that the formed ear of back space control lever M will be clear of the path of the extended hook on tab and return actuator G.

C34-35

a. With return paddle CE latched on stop latch CA, there should be .010" to .015" clearance between tab escapement pawl D and apex of upper escapement gear teeth.

b. With return paddle CE latched on stop latch CA, there should be .010" to .015" clearance between return escapement pawl L and apex of lower escapement gear teeth.

TO ADJUST,

a. Turn eccentric F as required.

b. Turn eccentric E as required.

REASON: To permit carriage tabulation and return.

C34-36 With tab paddle CF latched on stop latch CG, there should be .010" to .015" clearance between tab and return escapement pawls D and L and apex of upper and lower escapement gear teeth.

TO ADJUST, weave lever CB near ear of lever as required.

REASON: To ensure clearance of the escapement pawls when carriage tabulation is indexed.

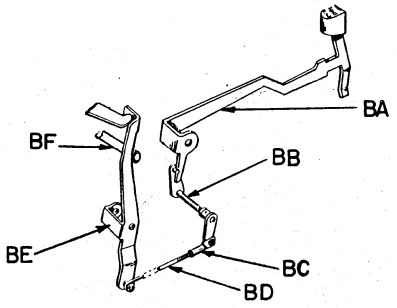


Fig. II-75

C40-1 With back space control lever O normal and the back space lever BA limiting against rubber bumper in keyboard top plate, there should be .015" to .020" clearance between front edge of bellcrank BE and shaft assembly BF.

TO ADJUST, rotate turn buckle BC as required.

REASON: To limit back space lever BA against rubber bumper in keyboard top plate and to prevent bellcrank BE from limiting against shaft assembly BF.

C40-2 With back space key depressed, return clutch engaged, and back space auxiliary latch J held inactive, manually move carriage in return direction. Return clutch should disengage when trailing edge of back space release pawl O is within .025" to .035" from apex of camming tooth of escapement gear.
TO ADJUST, turn eccentric N as required, maintaining clearance between eccentric N and tail of return stop latch CA, when return stop latch is active.
REASON: To properly time disengagement of return clutch.

C40-2A With return paddle CE latched by the primary return latch, the step of back space auxiliary latch J should have no less than a full side hold on return paddle CE.
TO ADJUST, bend the lower arm of back space auxiliary latch J as required.
REASON: To provide a safe hold of back space auxiliary latch J on return paddle CE.

C40-3 With back space key depressed, return clutch engaged and return stop latch CA held inactive, manually move carriage in return direction. Return clutch should disengage when trailing edge of back space release pawl O is within .015" to .020" from apex of camming tooth of escapement gear.
TO ADJUST, bend arm of back space auxiliary latch J to locate its formed ear as required.
REASON: To ensure back spacing into a carriage stop position.

C40-3A With the back space key depressed and return paddle CE held indexed by the primary return latch, the tension of spring I should overcome the tension of spring K to locate the step of back space auxiliary latch J under return paddle CE.
With back space lever M normal and return paddle CE held indexed by the primary return latch the tension of spring I should prevent the step of back space auxiliary latch J from latching under return paddle CE.
TO ADJUST, bend the spring anchor on back space lever M as required.
REASON: To control the positioning of back space auxiliary latch J during a carriage back space and during a carriage tab or return.

C40-3B Depress the back space key and index a carriage return function. When the primary latch is manually released, there should be no movement of back space auxiliary latch J when return paddle CE contacts the step of latch J.
TO ADJUST, re-check Test C6-12, carriage movements.
REASON: To ensure holding return paddle CE indexed when back space auxiliary latch J is active.

C40-4 With back space mechanism normal, switch B should be open. During depression of the back space key, manually permit the arm of actuator A to transfer the contact points of switch B to closed position. After the contact points are closed, there should be .015" to .020" additional movement of the arm on switch actuator A.
TO ADJUST, locate switch B as required.
REASON: To ensure transfer of contact points to closed position.

P22-1-2 "Hold power" voltage should be within 36-42 volts measured from terminal 3 to terminal 6 of terminal board 2. (Terminal board 2 * is located on top of terminal board 1 in left rear corner of base plate.) Using the same measuring points and closing "full power" switch No. 7, "full power" voltage should be within 65 to 85 volts. C1 1010 Full-70-80V Cno R2
TO ADJUST,
a. "Hold power", locate contact ring on "hold power" resistor as required.
b. "Full power", locate contact ring on "full power" resistor as required.
REASON: To establish correct operating voltages of the magnetic clutch for all carriage movements.

NOTE: Do not over-tighten contact rings on the resistors.

If no voltmeter is available use the following tests:

a. To ensure proper hold power --
With the panel removed, switch No. 7 disabled, and a return operation indexed, the magnetic clutch should provide a pull of 4 pounds.
TO ADJUST, relocate contact ring on resistor 2.

b. To ensure sufficient power of the magnetic clutch for all carriage functions --
With the power "ON" the carriage should return .1" against a spring scale pull of 2 pounds and fail to return .1" against a pull of 4 pounds.
TO ADJUST, relocate contact ring on register 1.

* TB 2 Nos. front to rear

ESCAPEMENT MECHANISM IN MACHINES BEGINNING WITH F124609P

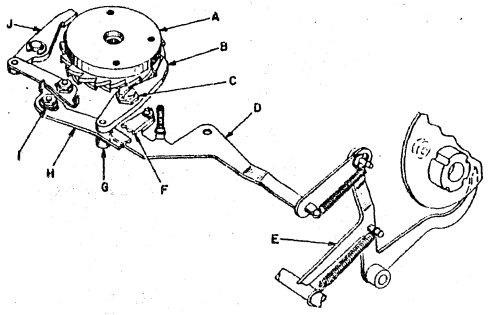


Figure II-75-1

A means of controlling the amount of backlash of escapement gear A, and thus improve control pin and sensing tappet alignment, is provided by two eccentrics C. Adjustment of the eccentrics positions tab pawl B forward or rearward to control backlash of the escapement gear between the tab and return escapement pawls.

Any adjustment of eccentrics C also changes the position of the carriage, requiring that the escapement gear be readjusted.

Double eccentric C used in machines beginning with F152822P.

Tests and Adjustments

C13-1-26. With the tab and return escapement pawls J and B engaged with the teeth in escapement ratchet A; rotate the escapement ratchet to limit its teeth against return pawl J. There should be .010" to .015" clearance between tab pawl B and the teeth of escapement ratchet A.

TO ADJUST: Starting with high side of eccentrics C toward the rear of the machine, turn the eccentrics equal amounts in opposite directions.

REASON: To maintain alignment of component parts in the control unit with the tappets.

C13-1-27 With tab paddle assembly CF latched on stop latch CG there should be .010" to .015" clearance between tab escapement pawl B and apex of upper teeth in gear A.

TO ADJUST, turn eccentric I as required.

REASON: To permit carriage tabulation. Adjust return pawl clearance per C34-35b (Page 55).

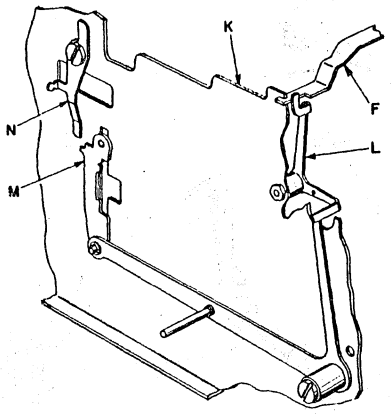


Figure II-75-2

C6-15 With tab pawl B engaged with the teeth of ratchet A there should be no less than .010" clearance between roller G and camming surface of link D.

TO ADJUST, bend rear arm of bellcrank E.

REASON: To prevent a false limit of tab pawl roller G against camming surface of link D, providing maximum depth mesh of tab pawl B with gear A.

C6-16 There must be clearance not to exceed .005" between blocking ear of bellcrank L and back plate K of sensing unit.

TO ADJUST, weave bellcrank L.

REASON: To maintain proper blocking requirements with carriage escapement link.

C6-17 With the lower step of control slide M limited by finger N; manually cycle the typewriter camshaft until the vertical arm of bellcrank E has reached its maximum forward travel. Tab pawl B should have no less than half hold in the tooth space of gear A.

TO ADJUST, bend escapement link F at its offset, maintaining freedom with links D and H.

REASON: To ensure disabling the carriage escapement when using the No. 4 typewriter control key in conjunction with lane 26 controls.

NOTE

Adjustments C10-2-15, Page 59 and C10-2-15A, Page 60 must be rechecked following any adjustment of eccentric C.

CARRIAGE BACKSPACE MECHANISM IN MACHINES BEGINNING WITH F148850P

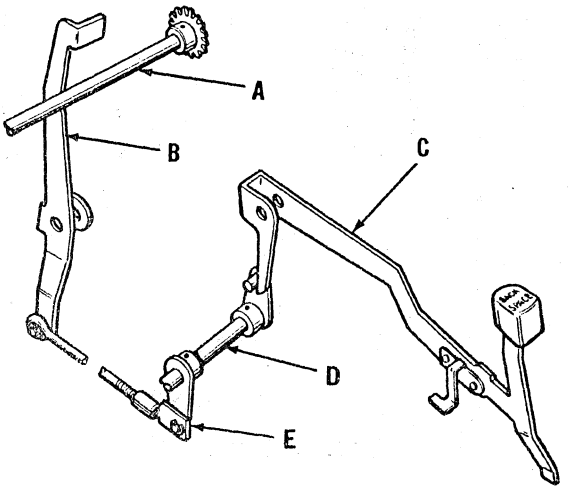


Figure II-75-3

Provides positive function of back space into and through carriage stop positions.

Tests and Adjustments

C40-1 With shaft assembly D rocked to limit back space lever C against rubber bumper in the keyboard top plate there should be .015" to .035" clearance between front edge of bellcrank B and shaft assembly A.
TO ADJUST: Rotate turnbuckle E.
REASON: To limit back space lever C against rubber bumper and to prevent bellcrank B from limiting against shaft assembly A.

C40-2 With back space key depressed, return clutch engaged and back space auxiliary latch N held inactive, manually move carriage in return direction. Return clutch should disengage when trailing edge of back space release pawl G is within .025" to .035" from apex of camming tooth in ratchet assembly H.
TO ADJUST: Turn eccentric F, maintaining clearance between F and latch P with the latch active.
REASON: To ensure disengagement of return clutch in timing with re-engagement of tab and return pawls with escapement ratchet.

C40-3 With the return paddle held indexed by the latch P, the step of the back space auxiliary latch N should have no less than a full side hold on the return paddle.

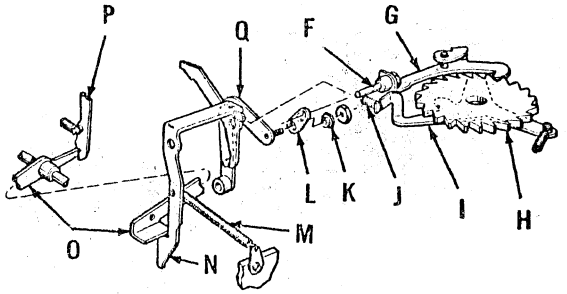


Figure II-75-4

TO ADJUST: Bend the lower arm of the back space auxiliary latch N.
REASON: To provide a safe hold of the latch N on the return paddle.

C40-4 With the machine at home position and starting with high side of eccentric K up, turn the eccentric to move link L to its right most position.
(A) Depress the back space key and index a carriage return function. Back space auxiliary latch N should have a full side and depth hold on the ear of return paddle O and link L should just contact and still have free lateral movement on the post in back space eccentric F.
(B) Depress the back space key and index a carriage return function. With return paddle O held indexed by the back space auxiliary latch N, manually move the carriage in the return direction. Return paddle O should release from back space auxiliary latch N when the trailing edge of back space release pawl G is within .025" to .035" from apex of camming tooth in ratchet H.
TO ADJUST:
(A) Weave back space auxiliary latch N.
(B) Turn eccentric K.
REASON: To ensure back spacing into a carriage stop position.

C40-5 Depress the back space key and index a carriage return function. As return paddle O is raised, the tension of spring J should overcome the tension of spring M, thus locating the step of latch N under paddle O.
With back space lever C normal, and return paddle O held indexed by primary return latch P, tension of spring M should prevent the step of back space auxiliary latch N from latching under return paddle O.

TO ADJUST: Bend the spring anchor on back space lever I.

REASON: To control the positioning of back space auxiliary latch N during a carriage back space, or during a carriage tab or return.

C40-6 Depress the back space key and index a carriage return function. When primary latch P is manually released, there should be no movement of the latch N when the return paddle contacts the step of the latch N.

TO ADJUST: Re-check Test, Code C6-12, Page 48, Sec. II.

REASON: To ensure holding return paddle indexed when the back space auxiliary latch is active.

REVERSE ENTRY KEY MECHANISM

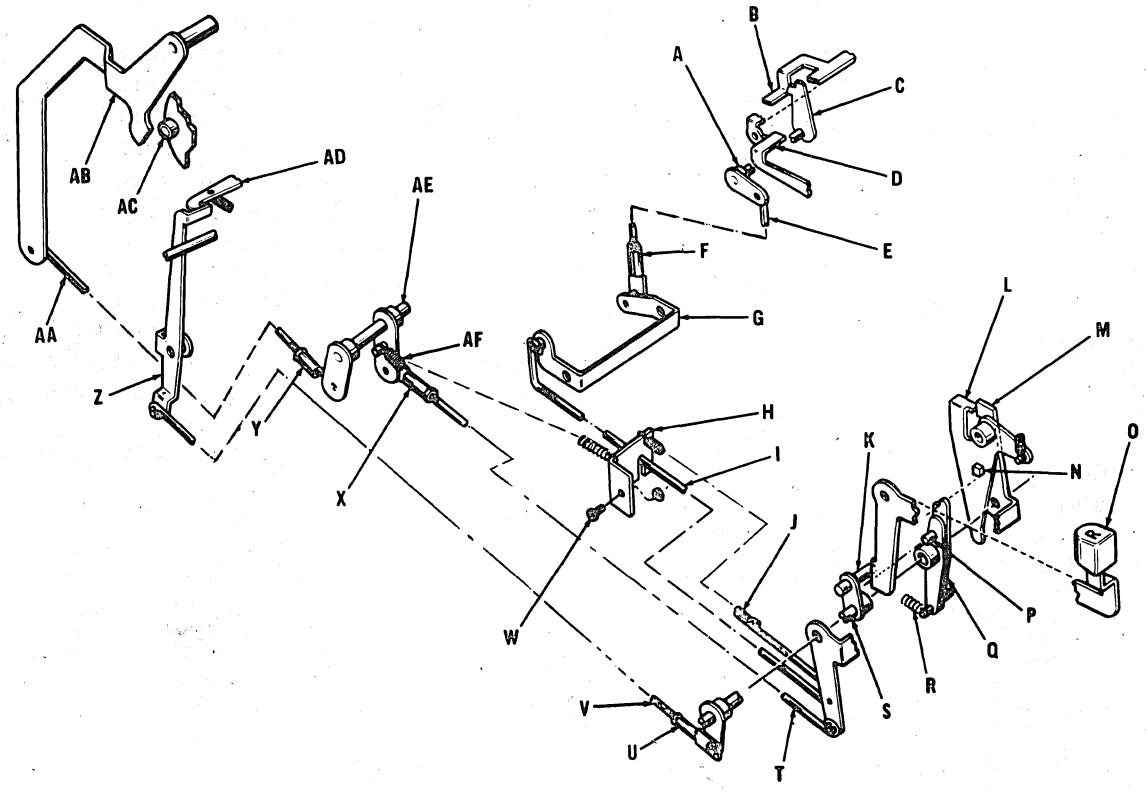


Figure II-75-5

Depression of reverse entry key indexes the back space functions and returns the carriage .1" from any programed stop position. The spear point interlock is latched inactive enabling a machine operation for the reverse entry posting.

Depression of reverse entry key O moves stud K rearward rotating shaft assembly S. Rotation of shaft assembly S pulls wire V forward rocking lever Z indexing a back space function.

Depression of reverse entry key O also contacts stud P rocking assembly Q. The upper camming surface of assembly Q contacts stud N raising the lip of part L clear of bail M. Spring AF rotates shaft assembly AE and through wire T rocks bail M. Rotation of bail M by wire I swings bail G to raise wire E and rotate shaft assembly A to position the upper step of latch C into the path of spear point interlock B, to hold the spear point interlock B rearward clear of drive trip arm D.

Also as shaft assembly AE is rotated wire AA pivots drive arm AB downward positioning its upper projection in the path of roll AC on typewriter cam.

During the back space operation roll AC cams drive arm AB rearward and through wires AA and T, resets bail M on lip of part L. Spear point interlock is held inactive by latch C as bail M is reset. A button head stud in bail M allows wire link I to remain forward. This enables a sensimatic machine operation which moves the carriage to a stop position where the additional throw of the spear point interlock B from the carriage stop releases latch C and shaft assembly A is restored by spring J.

Tests and Adjustments

NOTE: Before starting this test, loosen turnbuckle Y to prevent bind between drive arm AB and bell crank Z.

1. (C40-1-1) With carriage out of a stop position and reverse entry mechanism normal; there should be .025" to .035" clearance of B under projection of latch C.
TO ADJUST: Adjust turnbuckle F.
REASON: To establish home position of latch C.

2. (C40-1-2) (A) With carriage out of a stop position, depress the reverse entry key O and cycle typewriter camshaft until roll AC moves away from drive arm AB. Ear of drive trip interlock B should have approximately .025" hold of latch C.
(B) With the carriage in a stop position, depress the reverse entry key O and cycle typewriter camshaft until roll AC moves away from drive arm AB. There should be passing clearance between projection of latch C and drive trip interlock B.
TO ADJUST: (A and B) Bend projection of B horizontally.
REASON: (A and B) A. To prevent latch C from dropping through when carriage is out of a stop position.
B. To ensure latch C is free to drop when carriage is in a stop position.

3. (C40-1-3) With carriage out of a stop position, depress the reverse entry key O and cycle the typewriter camshaft until roll AC moves away from drive arm AB. There should be .015" to .030" clearance between step of latch C and the underside of projection on drive trip interlock B.
TO ADJUST: Adjust turnbuckle X.
REASON: To provide latching clearance and ensure entry of projection on drive trip interlock B over step of latch C.

4. (C40-1-4) With the carriage out of a stop position, depress reverse entry key O and cycle typewriter camshaft until roll AC moves away from drive arm AB. Manually latch projection of drive trip interlock B on step of latch C. Hold drive trip arm D and trip the machine. There should be clearance not to exceed .030" between drive trip arm D and interlock B.
TO ADJUST: Bend interlock B. If necessary bend projection of interlock B up or down.
REASON: To ensure a machine operation when reverse entry is indexed.

5. (C40-1-5) With carriage in a stop position, index reverse entry key O and cycle typewriter camshaft until roll AC moves away from drive arm AB. There should be minimum clearance between top of slot in guide H and wire I.
TO ADJUST: Loosen screw W and adjust guide H.
REASON: To prevent vibration of wire I.

6. (C40-1-6) Depress the reverse entry key O and cycle the typewriter camshaft until the roll AC is on the high point of drive arm AB. There should be 1/16" overthrow clearance between bail M and the front edge of lip on part L.
TO ADJUST: Adjust the turnbuckle Y.
REASON: To ensure latching of bail M.

7. (C40-1-7) With machine under power, place carriage in a stop position. Slowly depress the reverse entry key O until latch C moves rearward. Back space mechanism should be indexed simultaneously with movement of latch C or with slight additional depression of reverse entry key O. Carriage movement must not precede movement of latch C.
TO ADJUST: Adjust turnbuckle U. If necessary, bend ear of bell crank Z.
REASON: To ensure that latch C blocks projection of spear point interlock B during reverse entry operation.

CARRIAGE BACK SPACE MECHANISM IN MACHINES BEGINNING WITH F164777P.

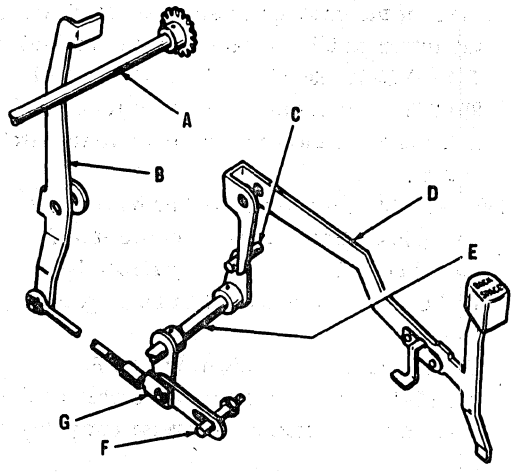


Figure II-75-6

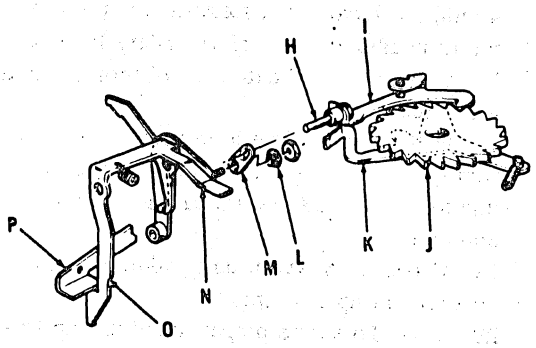


Figure II-75-7

Tests and Adjustments

C40-1 With shaft assembly E rocked to limit back space lever D against rubber bumper in the keyboard top plate there should be .015" to .035" clearance between front edge of bellcrank B and shaft assembly A.

TO ADJUST: Rotate turnbuckle G.

REASON: To limit back space lever D against rubber bumper and to prevent bellcrank B from limiting against shaft assembly A.

C13-3-8 With the tab and return shafts normal, manually rotate back space lever K to locate back space release pawl I in its rearmost position. There should be clearance not to exceed .006" between secondary return latch and eccentric H.

TO ADJUST: Starting with the high side of eccentric H to the left turn eccentric H.

REASON: To prevent latching of secondary return latch during a back space operation.

C40-4 With the machine normal and starting with high side of eccentric L up, turn the eccentric to move link M to its right most position.

(A) Depress the back space key and index a carriage return function. Back space auxiliary latch O should have a full side and depth hold on the ear of return paddle P and link M should just contact and still have free lateral movement on the post in back space eccentric H.

(B) Depress the back space key and index a carriage return function. With return paddle P held indexed by the back space auxiliary latch O, manually move the carriage in the return direction. Return paddle P should release from back space auxiliary latch O when the trailing edge of back space release pawl I is within .015" to .035" from apex of camming tooth in ratchet J.

TO ADJUST:

(A) Weave back space auxiliary latch O.

(B) Turn eccentric L.

REASON: To ensure back spacing into a carriage stop position.

C40-5 (A) With the machine normal there should be no less than .010" clearance between the formed ear on finger N and back space lever K.

(B) Depress the carriage return key. Finger N of auxiliary latch O should limit on back space lever K and the step of latch O should not latch paddle P.

(C) Depress the back space key and index a carriage return function. Back space auxiliary latch O should have a full hold under return paddle P and there should be slight clearance under the incline of finger N and back space lever K.

TO ADJUST:

(A & B) Bend finger N near bail O.

(C) Bend the end of finger N or lever K as required and re-check step "A" and "B" of the test.

REASON: To control the positioning of back space auxiliary latch O during a carriage back space, or during a carriage return.

C6-1 (A) With return paddle P held in its raised position by return latch, step of primary latch should not locate over forward extension of return paddle and step of secondary latch should locate over forward extension of return paddle when actuated.

(B) With return paddle held in its raised position by step of primary latch, return latch should locate under return paddle P when actuated.

TO ADJUST: Weave return paddle arm to position ear up or down.

REASON: To ensure proper function of primary and secondary latches.

C40-6 Depress the back space key and index a carriage return function. When primary latch is manually released, there should be no movement of the back space auxiliary latch when the return paddle contacts the step of the latch.

TO ADJUST: Re-check Test, Code C6-1.

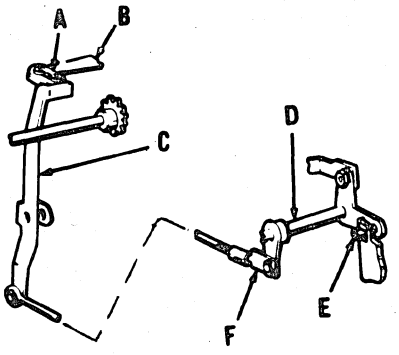
REASON: To ensure holding the return paddle indexed when the back space auxiliary latch is active.

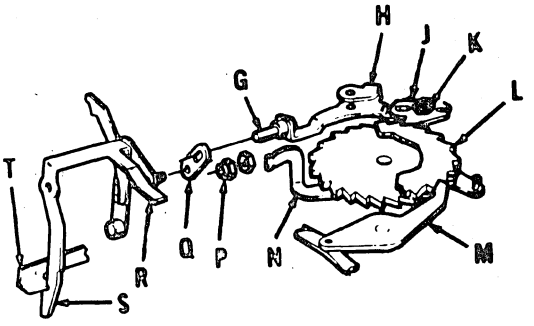
C40-1-8 With reverse entry and back space mechanism limiting on eccentric stud F, there should be .010" to .015" clearance between stud C and reverse entry and back space key-levers.

TO ADJUST: Turn eccentric stud F.

REASON: To prevent possible double back space from depression of reverse entry key.

CARRIAGE BACKSPACE IN MACHINES BEGINNING WITH F189251P





Tests and Adjustments

C40-9 (A) With shaft assembly D at normal and limited by stud E, adjusting plate A located rearward on lever B and play of bellcrank C held forward, there should be .020" to .040" clearance between ear of bellcrank C and forward end of adjusting plate A. (See note below.)
(B) With play of bellcrank C held forward, the adjusting plate A should barely contact the surface of ear on bellcrank C. (See note below.)
TO ADJUST:
(A) Rotate turnbuckle F as required.
(B) Position adjusting plate A as required.
NOTE: Adjusting plate A was not installed on any Ball Printer Series machines. The adjustment for all machines without adjusting plate A, is to adjust the lip of C.
REASON:
(A) To establish the initial position of bellcrank C relative to lever B.
(B) To provide maximum operating movement of lever B.

C40-10 With the machine normal and starting with the high side of eccentric P up, turn the eccentric to move link Q to its rightmost position. Turn high side of eccentric K away from the pivot point of backspace release assembly H.
(A) Depress the backspace key and index a carriage return function. Backspace auxiliary latch S should have a full side and depth hold on the ear of return paddle T, and link Q should just contact and still have a free lateral movement on the post in backspace eccentric G.
(B) Limit ratchet L against tab pawl M. When lever N is rotated, the apex of adjusting plate J should pass the apex of the tooth of ratchet L with a maximum of .006" clearance.
(C) Depress the backspace key and index a carriage return function. With return paddle T held indexed by the backspace auxiliary latch S, manually move the carriage in the return direction. Return paddle T should release from backspace auxiliary latch S when the trailing edge of backspace release assembly H is within .015" to .035" from apex of camming tooth in ratchet L.
TO ADJUST:
(A) Weave backspace auxiliary latch S as required.
(B) Turn eccentric K as required.
(C) Turn eccentric P as required.
REASON: To ensure backspacing into a carriage stop position.

C40-11 (A) With the machine normal, there should be no less than .010" clearance between the formed ear on finger R and backspace lever N.
(B) Depress the carriage return key. Finger R of auxiliary latch S should limit on backspace lever N and the step of latch S should not latch paddle T.
(C) Depress the backspace key and index a carriage return function. Backspace auxiliary latch S should have a full hold under return paddle T and there should be slight clearance under the incline of finger R and backspace lever N.
TO ADJUST:
(A) & (B) Adjust finger R near bail S as required.
(C) Adjust the end of finger R or lever N as required. Re-check step (A) & (B).
REASON: To control the positioning of backspace auxiliary latch S during a carriage backspace, or during a carriage return.

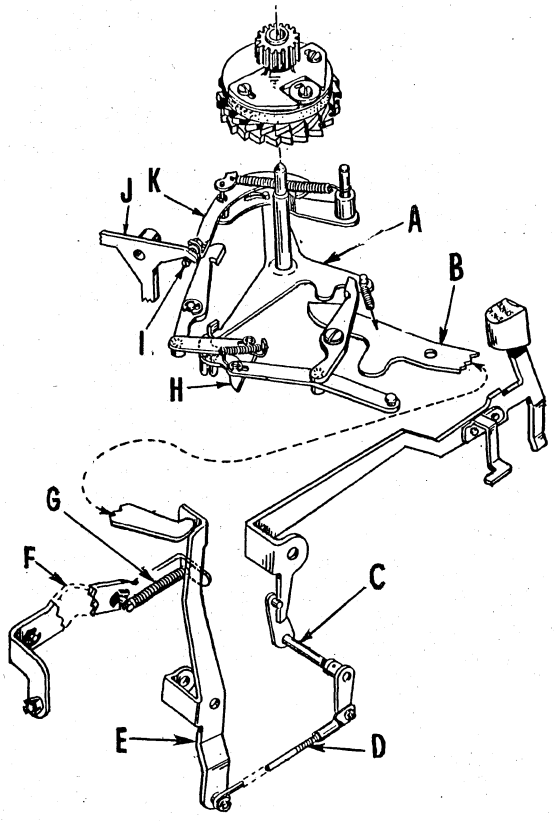


Fig. II-76

Back Space Mechanism in Machines Prior to F110535P

Tests and Adjustments

1. With the back space control lever A normal and the back space key limiting against the rubber bumper in the keyboard top plate, there should be no more than .003" play of the back space index lever E.
   TO ADJUST, lengthen or shorten wire D through the turn buckle.
   REASON: To secure full movement from the back space key.
2. With the back space index lever E in normal position, there should be .005" to .010" free movement of switch slide F.
   TO ADJUST, bend the forward formed ear of slide F.
   REASON: To ensure actuation of switch No. 6.
3. When the back space key is slowly depressed, switch No. 6 should close prior to engagement of the typewriter camshaft spring clutch.
   TO ADJUST, bend the rear formed ear of slide F.
   REASON: To time the closing of switch No. 6.
4. With the back space function indexed and the carriage manually returned, the return clutch should disengage when the trailing edge of release pawl K is .025" to .035" from the apex of the escapement gear tooth.
   TO ADJUST, turn eccentric stud I, but maintain clearance when indexing back space between stud I and tail of latched return stop latch.
   REASON: To time disengagement of the return clutch.

PANEL INSTALLATION

Tests and Adjustments

C10-2-13A The panel should ride freely on insertion guide rails AC, the schedule selector knob should turn freely, and the end play of the stop shaft should not exceed .003".

TO ADJUST, manually pull the panel to the left and move the left selector knob to the right as required.

REASON: To maintain alignment of component parts.

C10-2-14 Control panel latches E and U should hold the panel forward without binding on shaft AE. Schedule selector knob should turn freely.

TO ADJUST, turn eccentrics F in latches E and U as required and tighten screw R.

REASON: To hold panel firmly in position yet allow free lateral movement.

C10-2-16 Remove the third rail. Lower roller assembly AF which supports the front edge of the panel to an inactive position. With the panel inserted into the carriage there should be .040" go to .046" no go clearance between the tappets in lane 6 and lane 21 and front and rear projections of reference magazines on right end, center, and left end of carriage.

TO ADJUST FRONT END OF PANEL.

(a) With high point of eccentrics AH in links AG to the rear loosen screw (similar to X) in right sideframe.

(b) Adjust eccentric (similar to AA) as required and tighten screws (similar to X) and similar to Z.

(c) On left sideframe loosen screw X, move bracket W away from rack Y, and snug down screw X.

(d) Adjust eccentric AA as required and tighten screw Z.

(e) Locate bracket W to have from .005" to .010" clearance between rack Y and bracket W and tighten screw X.

TO ADJUST FRONT CENTER OF PANEL:

(a) Raise roller assembly AF as required.

TO ADJUST REAR ENDS OF PANEL:

(a) On first panel of a multi-panel installation, (or set panel) turn eccentrics AH in links AG as required.

(b) On additional panels turn eccentrics T as required.

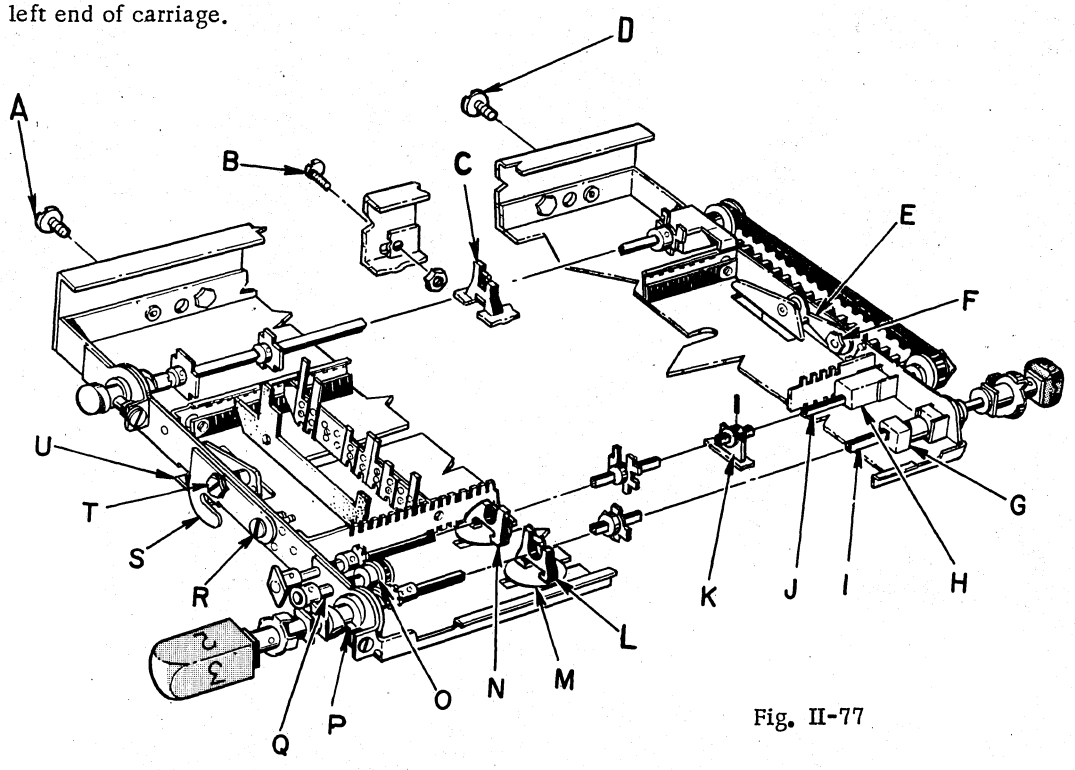


Fig. II-77

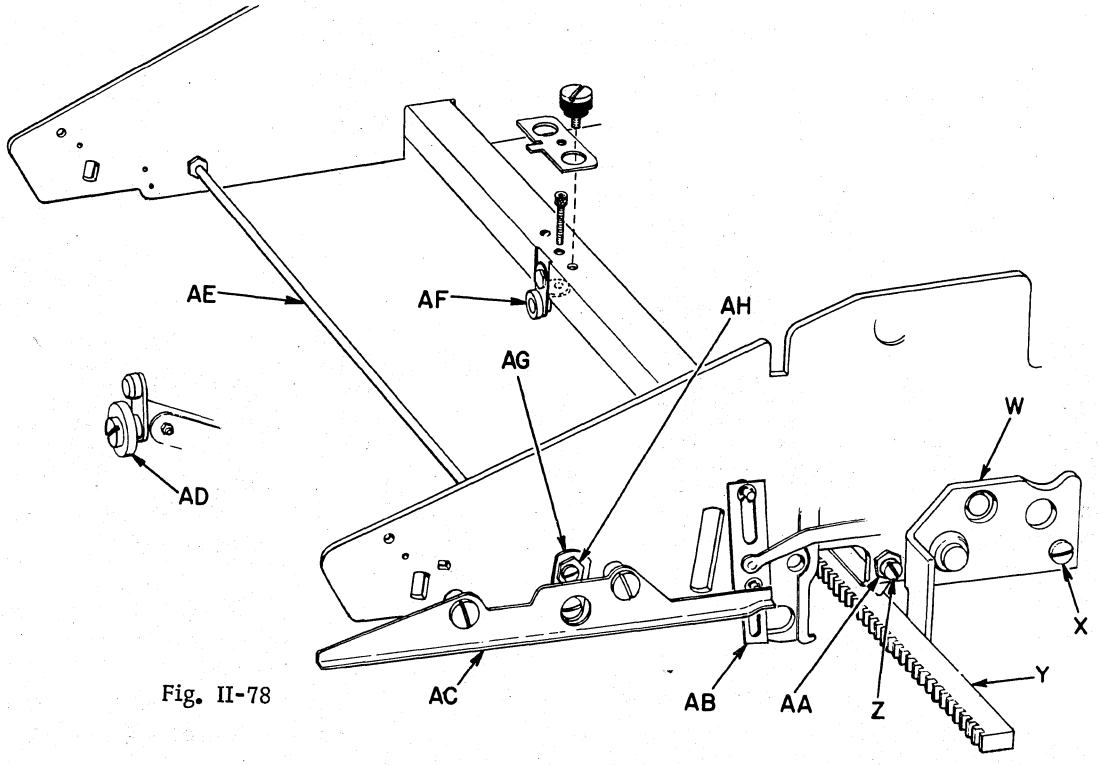


Fig. II-78

TO ADJUST REAR CENTER OF PANEL:
NOTE: Reassemble third rail and be sure that eccentric B is loosened to prevent a false limit when setting third rail.

(a) With reference magazine in right and left end of panel located in line with lower roll AD on rear panel support, there should be clearance not to exceed .005" between the lower surface of lip on third rail and lower roll AD on rear panel support. Place a gauge between lower roll AD and third rail, tighten third rail screws A and D in end positions making sure that gauge does not lift panel hooks S off shaft AE.

(b) With the short rear projection on center reference magazine located over tappets, turn eccentric B in third rail as required and secure with nut. Tighten center screws in third rail.

REASON: To provide uniform height and proper clearance between the panel and its relative assemblies.

C10-2-15 With spearpoint centrally aligned between stop latches, control panel inserted into carriage, and "hold power" applied to carriage, apex of the stop dogs should align centrally with the apex of the spear point.
TO ADJUST, set eccentric V on escapement gear as required.
REASON: To position stop dogs centrally between stop latches and to ensure release of the spearpoint interlock.

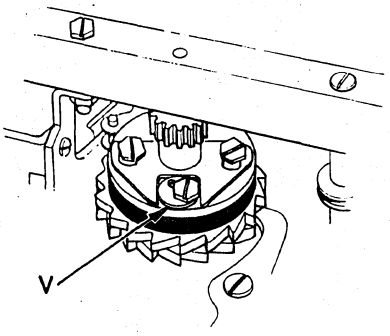


Fig. II-79

C10-2-15A With the control panel inserted into the carriage and "hold power" applied to the carriage, the control pins must be in alignment with the tappets in the sensing unit.
TO ADJUST, loosen set screw in gear O and turn eccentric P as required.
REASON: To align the control pins with the tappets.
NOTE: Readjust idler shaft Q.

1. Recheck alignment of disks on forward skip shaft to align with control pins.
2. Check for interference gear O, braces L, detents G and H when making adjustment.

C10-2-17 With the form guide placed in the carriage there should be from .001" to .003" clearance between form guide bar and eccentric studs on upperside of panel. Clearance must be checked when eccentrics are located over tappets. On machines with a split platen, skids should be set to active position to avoid a false limit.
TO ADJUST, turn eccentric studs as required.
REASON: To maintain the proper position of the panel at its front edge when sensing tappets thrust upward to index carriage controlled functions.

C10-2-18 With the panel inserted into the carriage, interlocks AB must drop freely to their lowest position to lock shaft I and J in their square detented positions in the spring clips. The stop dogs and disks must be squarely located in the panel.
TO ADJUST, check component parts to meet requirements.
REASON: To ensure that stop dogs and disks are square with their related operating components.

CARRIAGE MOVEMENT SPECIFICATIONS

The Series F1000 machine is designed to enable programming the panel to almost any application. Building the panel to perform the desired application is dependent upon the proper placement of stops, disks and control pin magazine assemblies. Since the control pin magazine assemblies can be located only in multiples of .1", carriage stops and disks which control carriage movement should also be placed in tenths of an inch. Commonly used but requiring the most exacting placement of controls is the "overlapping skip" operation. This operation uses the last skipped stop as an index stop on a later machine operation controlled by the same skip latch. For example: skip from 1 to 3, then skip from 2 to 4. Since all carriage stops perform the same function - release the stop latch - there is no difference between accounting stops and typing stops and the application should use a common stop whenever possible.

1. Release disks for lanes 1 through 5 may be placed up to .3" beyond the selected stop position. This flexibility enables combining release disks for other lanes of control and other schedules. When the release disk is placed .3" beyond the selected stop, carriage movement will be stopped regardless of the distance between stops. This is due to carriage stops releasing the stop latch simultaneously with the disks releasing the skip latch. This condition will not permit an "overlapping skip" through a stop position.

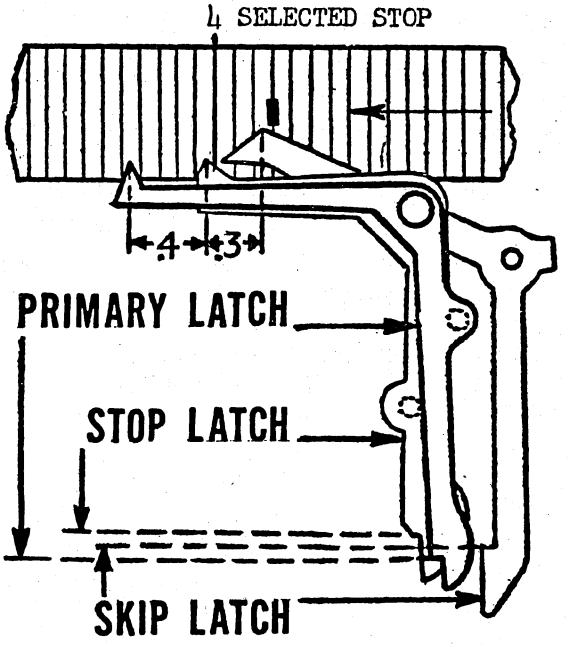


Fig. II-80

2. Release disks for lanes 1 through 5 must be placed at least .5" from the last skipped stop, to ensure skipping the stop. This will permit the stop latch to restore to latch position (after being depressed by the skipped stop) before the release disk contacts the incline of the skip latch.

3. Release disks for lanes 1 through 5 must be placed exactly .5" from the last skipped stop to accommodate an "overlapping skip". When the skipped stop is subsequently used as an index stop, the release disk so located will permit the skip latch to restore to latch position before the outgoing stop releases the primary latch. This is the sole purpose of the primary latch.

4. The carriage stop to the left (tab) and to the right (return) of the index stop should be .4" or more from the index stop, when used in an "overlapping skip". This is to prevent releasing the primary latch before the skip latch is restored to latch position.

5. When an adjacent stop .4" or more from the index stop is selected by skip control (tab or return), the release disk must be at least .7" from the index stop. This ensures release of the primary latch from the outgoing stop prior to or simultaneous with release of the skip latch. When adjacent stops are .2" or .3" apart the release disk should, of course, be .3" beyond the selected stop (rule A). This is possible because the stop latch automatically releases the primary latch.

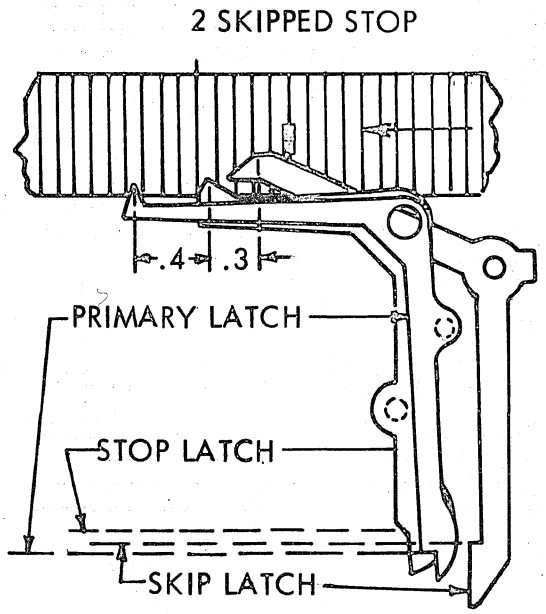


Fig. II-81

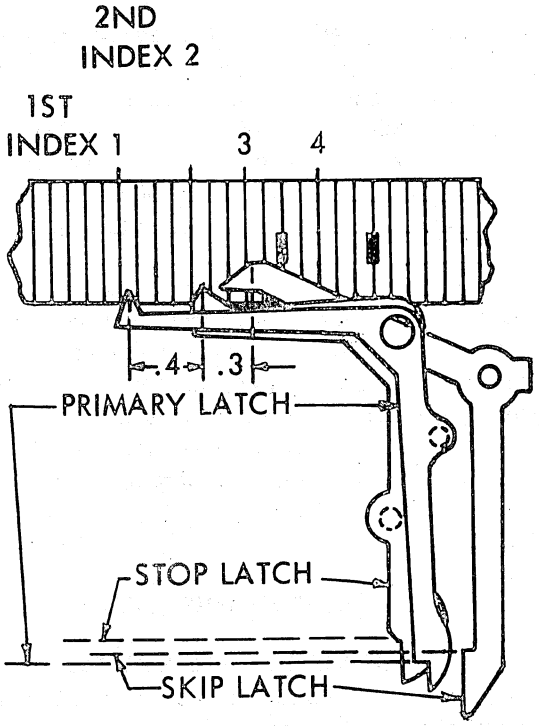


Fig. II-82

6. Typewriter release disks for lanes 26 through 30 should be placed in line with the stop, to secure simultaneous release of the typewriter skip latch and the carriage stop latch and to properly control lane 26 skid. When additional disks are required for lane 26 due to word length, the disks should not be more than one inch apart.

7. Minimum carriage tabulation is .1", but minimum "skip" movements should be .4".

8. Minimum placement of stops for all other operations, including "reverse tab", is .2".

9. Skip movements may be made to the first stop in a group of .1" stops but should never be attempted into the group.

The following limitations should also be considered;

10. The stop shaft and the skip shafts should be supported with a brace approximately each five inches of shaft.

11. Release disks for lanes 3, 4, and 5 should never be placed in stop positions.

12. Two, three, and four schedule stops must, of course, collate with control pin magazone assemblies.

√Flexibility in programing of Carriage Movement has been provided by the use of 1/10" stops in all 1/10" tabulating machines. Since the 1/10" stops do not contain an anchor screw, no more than two stops may be used adjacent to one another between two anchored stops. In addition to the twelve preceding basic rules, the additional rules also apply.

13. A single release disk located between two collated stops .6" apart should not be used to release tab in one schedule and return in the other. Use separate release disks for each schedule to allow for individual placement.

14. If .2" return is desired and a stop is located .3" to the right of index stop, a special PR stop (Permit Return) is required for the stop located .3" to the right of index stop. The PR stop has stock removed to permit primary latch to function.

15A. Bar 1 may tab .1" in lane 1. A release disk is required .3" from the index stop. Successive .1" tabs from bar 1 require a release .3" from each selected stop. (Application of rule 1).

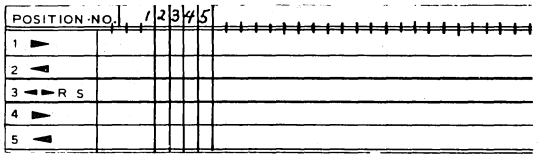
15B. When more than two successive .1" stops are programed for bar 1, lane 3 must be programed to skip from the last stop or lane 4 programed for bar 2. Lane one should not be used due to possibility of skip latch failing to function properly.

√PROGRAMING EXAMPLES FOR 1/10" TABULATING MACHINES.

REAR AND SIDE INSERTION PANELS

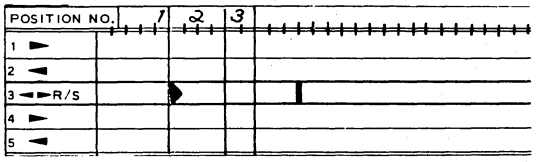
Basic carriage movement may be programed down to a minimum of .1" stops.

Example: Pos. 1 to 2 to 3 to 4 to 5.



A bypassed stop must not be less than .2" from the selected stop.

Example: Pos. 1 to 3.

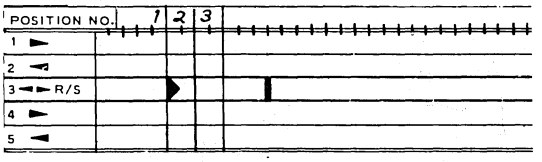


Release Disk Positioning:

(A) Not less than .5" beyond the last bypassed stop.

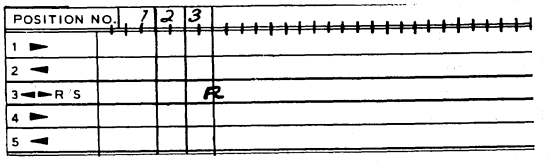
(B) Not more than .3" past the position where the carriage is supposed to stop.

Example: Pos. 1 to 3.



With a Lane 3 return index, the carriage will move to the next (left) adjacent stop if it is .2" or more away.

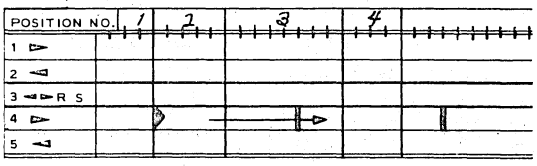
Example: Pos. 3 to 2.



√Changes or additions since last issue

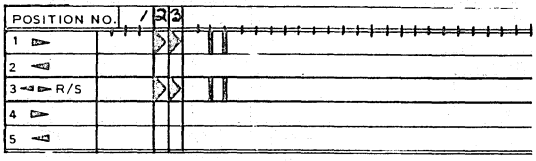
A release disk for "overlapping" a skip or return operation must be exactly .5" beyond the second index.

Example: Pos. 1 to 3 and Pos. 2 to 4.



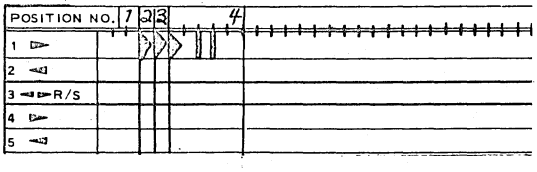
A skip tab from the point of index to a desired stop .1" to the right can be programed by placing a release disk exactly .4" from the point of index.

Example: Bar 4 at Pos. 1 will cause a skip tab in lane one to Pos. 2 and also from Pos. 2 to 3. Operation of Bar 1 with DSR will cause a skip tab in lane three from Pos. 1 to 2 and from Pos. 2 to 3.



It is possible to bypass a stop in lane one or three after one or two .1" skip tabulations.

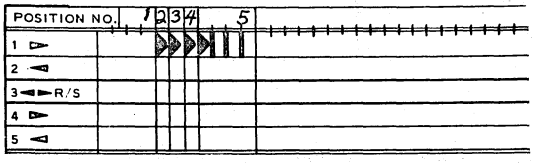
Example: Operation from Bar 4 or Bar 1 with a DSR will cause a skip tab in lane one from Pos. 1 to 2 and Pos. 2 to 3 - and from Pos. 3 you will bypass Pos. 4 and skip until released. A similar .1" return movement cannot be programed.



It is not possible to bypass a stop in lane one or three after three or more successive .1" skip tabs.

Example: Operation from Bar 4 or Bar 1 with DSR will cause a skip tab in lane one from Pos. 1 to 2, 2 to 3, 3 to 4, and 4 to 5.

NOTE - There is no need for a release disk in lane one for Pos. 5 - this limitation can be bypassed by switching lanes (1 to 3 or 3 to 1)

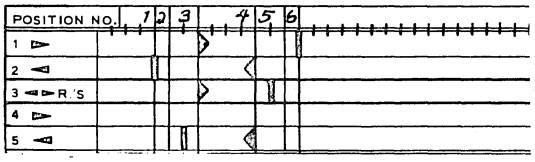


A skip tab .4" or more to the right or a return from the point of index to a desired stop .4" or more to the left can be programed by placing a release disk exactly .5" from the point of index when there is another stop .2" behind the point of index.

NOTE - If there is a stop .2" behind a point of index and a release disk .5" from point of index, the machine will take basic movement to the next stop regardless of where the stop is located.

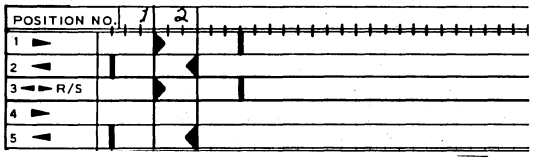
Example: Operation from Bar 4 or Bar 1 or Status Check with a DSR will result in a skip tab from Pos. 3 to 4. Operation from Bar 2 or Bar 1 will return from Pos. 4 to 3.

NOTE - This may be necessary in lanes 3 and 5 because the release disk cannot be located on a stop as it can be (illustrated) in lanes 1 and 2.



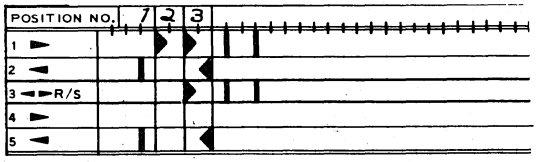
A skip tab from the point of index to a desired stop .3" to the right or a return from the point of index to a desired stop .3" to the left can be accomplished by programing a release disk .6" away.

Example: Pos. 1 to 2 and Pos. 2 to 1.



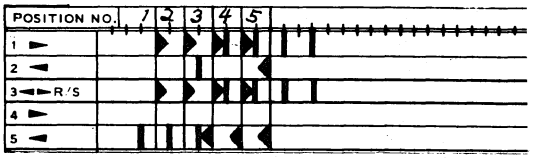
A skip tab from the point of index to a desired stop .2" to the right or a return from the point of index to a desired stop .2" to the left can be programed by placing a release disk exactly .5" from the point of index.

Example: Operation of Bar 4 or Bar 1 with a DSR at Pos. 1 will cause a skip tab in lane one to Pos. 2 and from Pos. 2 to 3 (Bar 4 in Lane one and Bar 1 in Lane three). Bar 2 will cause a return in Lane five from Pos. 3 to 2 and Bar 1 in Lane two will cause a return from Pos. 3 to 2, also.

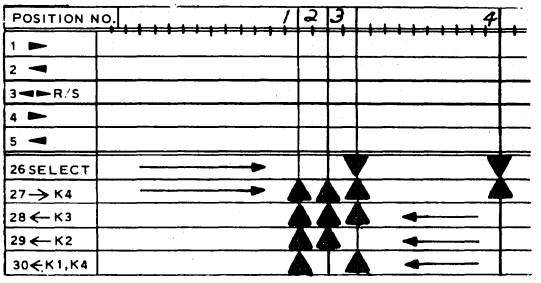


There is no limit to the number of successive .2" skip tabs or returns.

Example: Operation from Bar 4 or Bar 1 with a DSR will cause a skip tab from Pos. 1 to 2, from Pos. 2 to 3, from 3 to 4, and from 4 to 5. Operation from Bar 2 will cause a return from Pos. 5 to 4, 4 to 3, and 3 to 2.



When using a typewriter skip or return lane, a minimum of .2" must be provided between release disks which are shown on the layout right on the selected stop. The distance between successive lane 26 disks (inverted) must not exceed 1".



Burroughs

SERIES F 1000

TYPING SENSIMATIC ACCOUNTING MACHINE

INSTRUCTION BOOK

Section IV

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SERVICING PROCEDURES

Printed in U. S. America—6-1-61

For Form 3741

PREVENTIVE MAINTENANCE GUIDE

✓ The following is an outline of procedure to follow on a Preventive Maintenance Attention to an Alphanumeric Accounting Machine.

A. INITIAL PROCEDURE:

Prior to any mechanical work, perform the following steps:

1. Inquire of the operator of any conditions that he (or she) has noticed which require correction.
2. Determine from the operator if there are any totals in the machine. When P.M. is completed, make sure they are re-entered correctly.
3. Make operating test of the machine. Use all keys, operator control keys, motor bars, etc. Note any peculiarities of operation with respect to machine speed, unusual sounds, printing, carriage movement, accumulation, etc.

✓ B. APPROVED LUBRICANTS AND CLEANING AGENTS:

The lubricants used in the product are listed below and apply in general as stated. Special lubrication instructions will be found under the "Specified Sections" part of this guide.

1. Machine Oil 1624 9245 - to be used on all shaft bearings, pivot points, rollers, oil holes, and metal to metal contact of moving parts.
2. Grease 1624 9427 - to be used on all cam edges, forked arms, and slots where contact is made with studs, bearing surface of nylon idler pulleys, all metal gears, and metal to metal contact of moving parts where oil will not suffice.
3. Grease 1624 8783 Texaco Uni-temp. - to be used on plastic or nylon actuators of all switches, and in place of 1624 9427 grease where there is danger of grease thinning and dropping on electrical components.

   NOTE: Care should always be taken when lubricating mechanisms where an excess of lubricant may get on electrical components and cause a malfunction.
4. Silicone Release Agent 1624 9336 - to be used on solenoid plungers.
5. Platen Restorer 1624 9070 - to be used to clean platen, pressure rolls, feed rolls, and twirlers.
6. Case Cleaner and Polish 1624 9146 - to be used for cleaning all case panels.
7. Drive Oil 1624 9401 - to be used on upper and lower bearings of tab and return shift assemblies in gear box.

C. GENERAL INSTRUCTIONS:

The inspection should be performed systematically, and cover all sections of the machine. Special attention should be given to areas where experience has indicated trouble may exist.

1. Each section should be properly cleaned of all dust, old grease, and foreign matter. Lubricate as outlined above.

✓ Changes or additions since last issue.

2. All parts and mechanisms should operate freely, without interference from adjacent parts, and perform according to tests and adjustments. Make necessary corrections to meet these conditions.
3. All sections should be inspected for worn, broken, or defective parts. Replace any faulty parts. All loose nuts, screws, etc. should be tightened.
4. All wiring should be checked to be assured of it being in good condition and clear of moving parts. All electrical connections should be tight.
5. Applicable RIN improvements should be installed to maintain the machine in the best condition.

D. SPECIFIC INSTRUCTIONS:

The Basic Sensimatic Preventive Maintenance Guide is to be used for that portion of the machine to which it applies. Listed below are sections in addition to the basic machine, and the servicing procedures to follow.

1. Typewriter keyboard unit:
   a. Apply general instructions.
   b. Check keylevers for free and easy depression.
   c. Check adjustments of drive trip and interlocks.
   d. Lubricate with machine oil 1624 9245.
   e. On ball typers, care must be taken to lubricate the code shafts where they project thru the keyboard side frames.
2. Decoder and print head (ball typer).
   a. Apply general instructions.
   b. Check all adjustments.
   c. Clean the print sphere with a soft cloth.
   d. Lubricate with grease 1624 9427 and machine oil 1624 9245.
3. Writer Unit.
   a. Apply general instructions.
   b. Check toggle links, lift slides, transport mechanism, code assembly and all bearings for wear. Replace worn parts.
   c. Check all adjustments.
   d. Clean the type in the type box - using Platen Restorer.
   e. Check the rolls and eccentrics on the power transfer shaft for wear and adjustment.
   f. Check writer section interlocks, shift key interlock and drive trip interlock for correct function.
   g. Lubricate with grease 1624 9427 and machine oil 1624 9245.
4. Left side frame section and auxiliary left side frame section.
   a. Apply general instructions.
   b. Check the condition of the typewriter camshaft assembly, cams, rolls, trip bellcrank, and spring clutch.
   c. Check register selection mechanism for proper adjustment.
   d. Lubricate with machine grease 1624 9427 and machine oil 1624 9245.

5. Escapement unit.
   a. Apply general instructions.
   b. Check the condition of stop latches, paddle shafts and skip latches.
   c. Check clearance of escapement pawls with escapement gear and check mesh of escapement gear with carriage rack.
   d. Lubricate with machine grease 1624 9427 and machine oil 1624 9245.
6. Power mechanism.
   a. Apply general instructions.
   b. Check condition of all gear belts and idler pulleys for wear, tension, and alignment.
   c. Remove motor friction clutch, clean the arbor and the friction disc K with Platen Restorer 1624 9070. Lubricate the groove of the arbor with a light coat of grease 1624 9427. Reassemble the unit, test and adjust.
   d. Check clutch dog for wear and large bronze gear for minimum side play.
   e. Check machine for proper operating speed.
   f. Check cams on main camshaft for wear.
   g. Lubricate with machine oil 1624 9245 and machine grease 1624 9427.
7. Electrical power unit.
   a. Check all wires to be in good condition and install all applicable RIN improvements.
   b. Check for simultaneous actuation of keyboard carriage movement switches and proper actuation of all other switches.
   c. Check all solenoid plungers to be free from sticking. If sticking is indicated, remove plunger and clean with a soft cloth and Platen Restorer 1624 9070. Lubricate with a thin film of Silicone Release Agent (oil) 1624 9336.

✓ NOTE: If adjustments, other than adjustments contained in Series F Technical Manual, Form 3740, or Series F1000 Technical Manual, Form 3741, are necessary to maintain a satisfactory level of operation of the system, a complete report describing the need for such adjustment must be made to Field Engineering Technical Operations, Group II, Home Office.

After the completion of inspection, have operator test machine. Prepare service report forms.

✓ Changes or additions since last issue

REMOVAL AND REPLACEMENT PROCEDURE

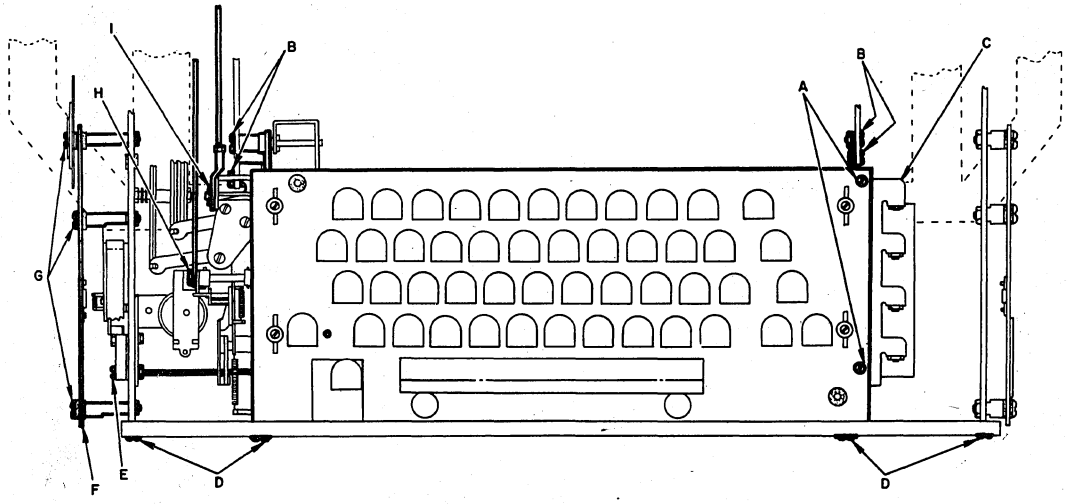

Fig. IV-1

TYPEWRITER KEYBOARD

A. Removal

Remove parts in the following order:

1. Four screws D and front panel.
2. Clip I on shift linkage.
3. Eccentric H and nut on trip linkage.
4. Three screws G and case panel bracket F.
5. Screw E in switch 5 only if the screw extends to the keyboard.
6. Two screws A and nuts and switch assembly bracket C.
7. Two upper and two lower screws B holding keyboard to machine side frames.
8. Typewriter keyboard.

B. Replacement

1. Replace parts in reverse order.

   Note: To ensure proper positioning of the keyboard, install front panel with screws D before tightening screws B.

WRITER SECTION

A. Removal

Remove parts in the following order:

1. Sensimatic keyboard.
2. Ribbon and ribbon feed slides.
3. Posts C and case panel retaining plate D.
4. Screw A and shoulder nut B.
5. Screw F.
6. Right ribbon guide post G.
7. Left ribbon post assembly and ribbon shield E.

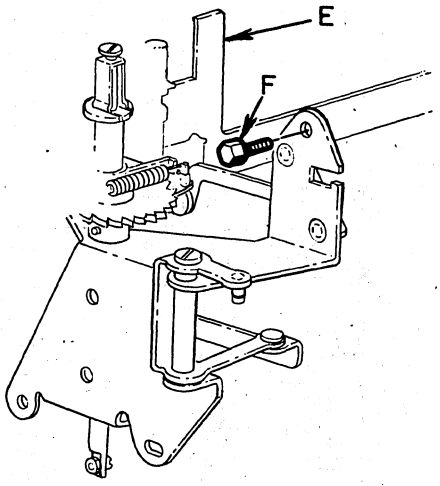

Fig. IV-3

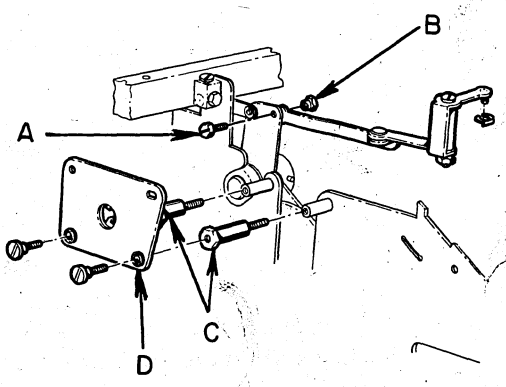

Fig. IV-2

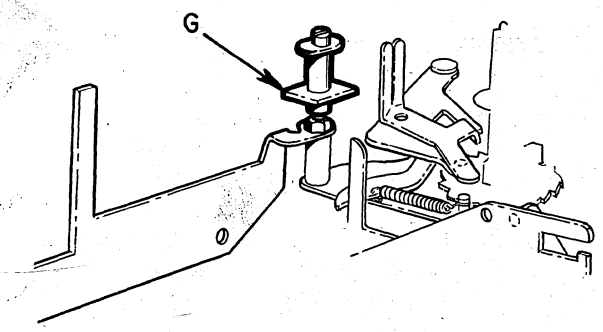

Fig. IV-4

8. Insert a small cloth under lower end of code links M, to hold in upward position. Unhook links M from levers L.
9. Unhook primary latch link S from power transfer shaft.
10. Unhook toggle link springs R from power transfer shaft.
11. Unhook clip Q retaining toggle pin.
12. Unhook spring P and remove clip N from the vertical rebound latch O. Drop latch into the machine.
13. Clip J, take code lever drive arm K off post I.
14. Loosen three writer section screws in front and remove three rear screws of writer section.
15. Rotate power transfer shaft to raised position and remove writer section.

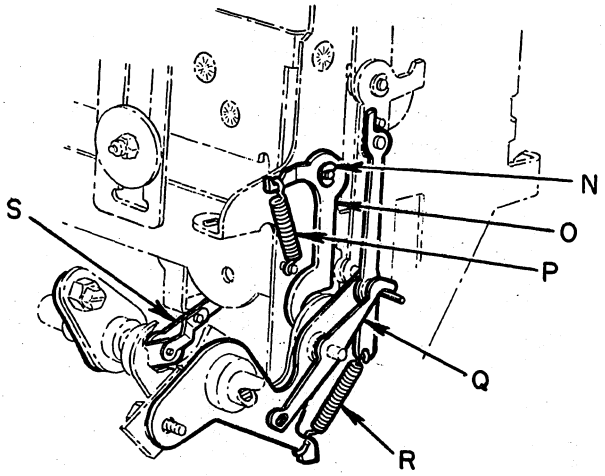

Fig. IV-6

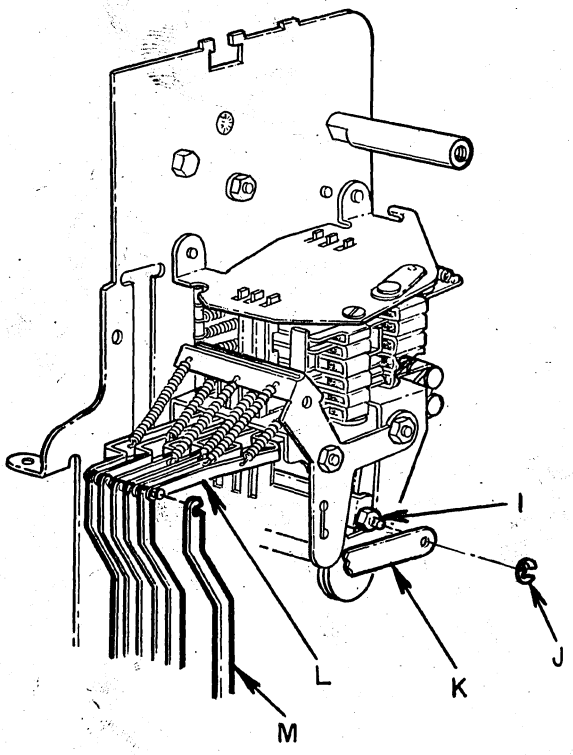

Fig. IV-5

B. Replacement
1. Replace parts in reverse order.
2. Check writer section adjustments on pages 34-38, Section II, Series F1000 Instruction Book.
3. Check adjustment K6-6, Page 25, Section II, Series F1000 Instruction Book.

POWER TRANSFER SHAFT

A. Removal

Remove parts in the following order:

1. Writer section following removal procedure.
2. Pin A and ribbon lift arm B.
3. Shaft C.
4. Nut E, lockwasher F, and eccentric G.
5. Spring I.

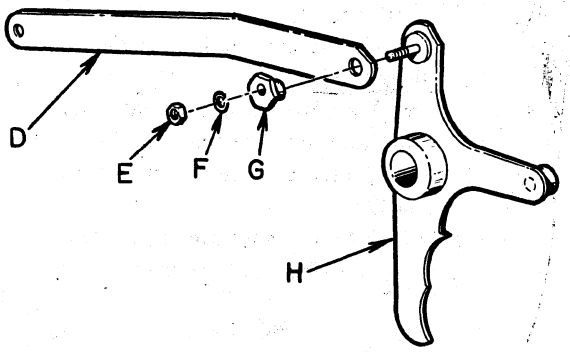

Fig. IV-9

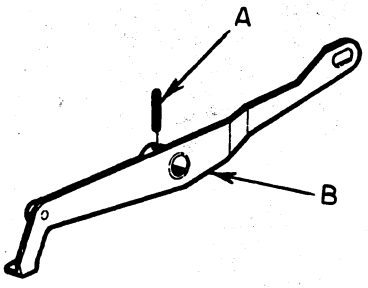

Fig. IV-7

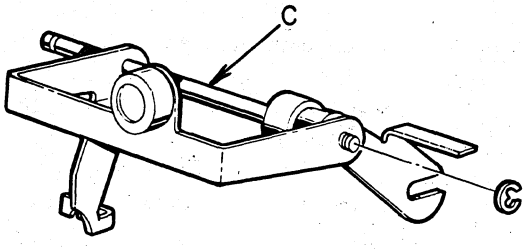

Fig. IV-8

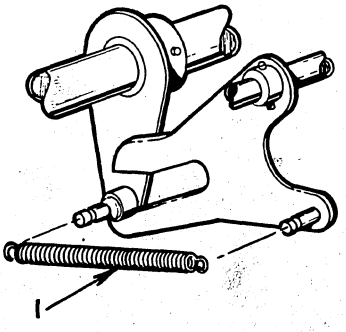

Fig. IV-10

6. Bracket J.
7. Spring P, two small clips O, take switch N off the two studs.
8. Rear screw S, loosen front screw Q, swing switch R so that screw K and L can be reached.
9. Right screw K, loosen left screw L, swing bracket M away from the power transfer shaft.
10. Nut U and screw V. Rotate brace W for ribbon shaft and remove.
11. Rotate power transfer shaft to remove two screws holding brace T to the crossmember and remove brace T.
12. Left power transfer shaft bearing Z.
13. Clip Y and link X for ribbon feed.
14. Power transfer shaft.

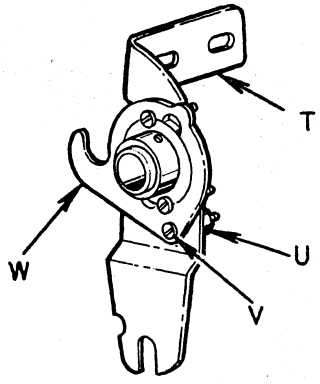

Fig. IV-13

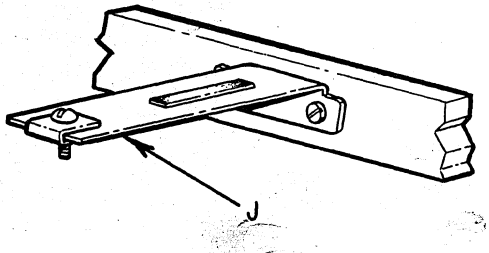

Fig. IV-11

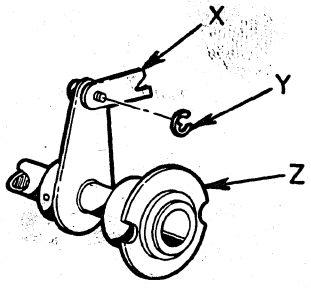

Fig. IV-14

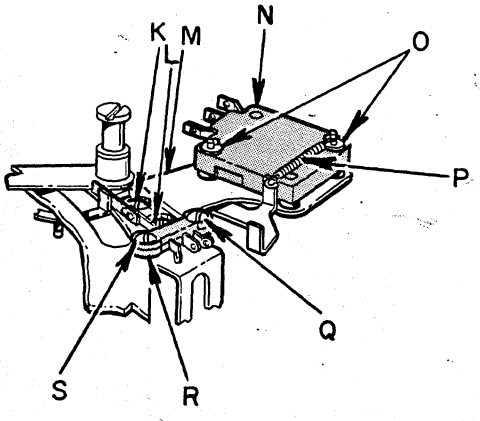

Fig. IV-12

B. Replacement
   1. Replace parts in reverse order.
   2. Check power transfer shaft adjustments on pages 36-38, Section II, Series F1000 Instruction Book.
   3. Check adjustment C40-4, page 56, Section II, Series F1000 Instruction Book.
   4. Check adjustment for Tab Interlock Switch S-11 C36-3, page 24, Section II, Series F1000 Instruction Book.

MAGNETIC CLUTCH

A. Removal

Remove parts in the following order:

1. Drive belt from pulley D on left side of magnetic clutch.
2. Actuating slide F for switch 7.

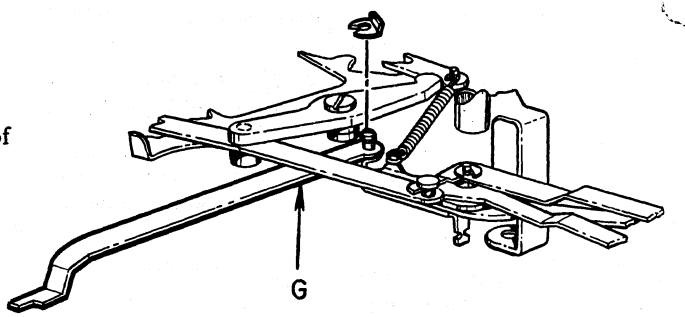

Fig. IV-17

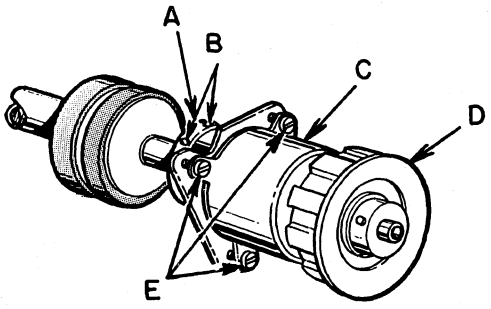

Fig. IV-15

3. Link G.
4. Loosen bearing housing C by removing three (3) screws E.
5. Loosen screws B in collar A and slide collar A to the right.
6. Screws K and screw I to loosen bracket J.
7. Tab and return belt from small pulley H on right side of magnetic clutch.
8. Remove magnetic clutch.

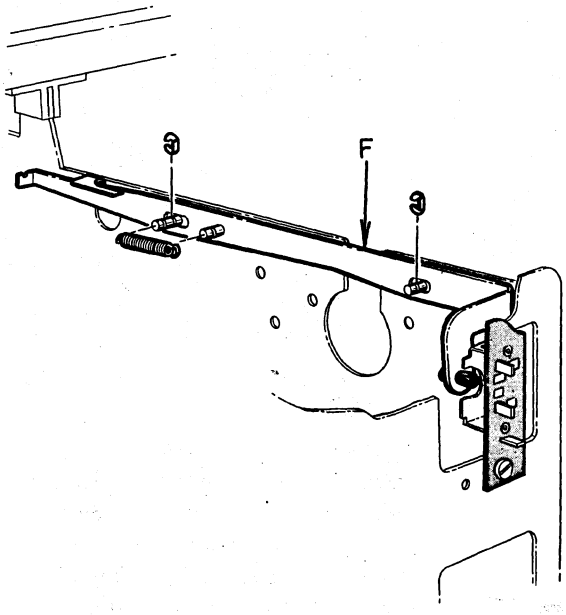

Fig. IV-16

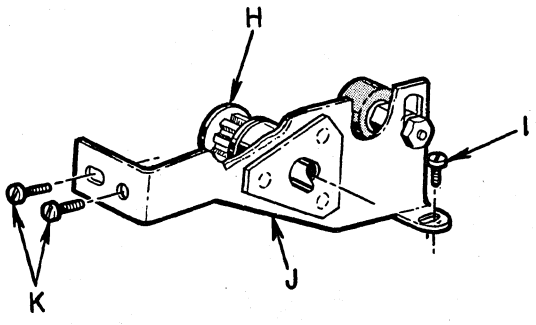

Fig. IV-18

B. Replacement

Replace parts in reverse order.

AUXILIARY LEFT SIDE FRAME

A. Removal

Remove parts in the following order:

1. All machine case panels.
2. Sensimatic keyboard, ribbon, ribbon feed slides, and left ribbon post assembly.

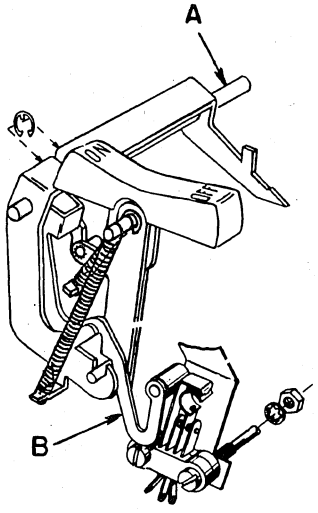

Fig. IV-19

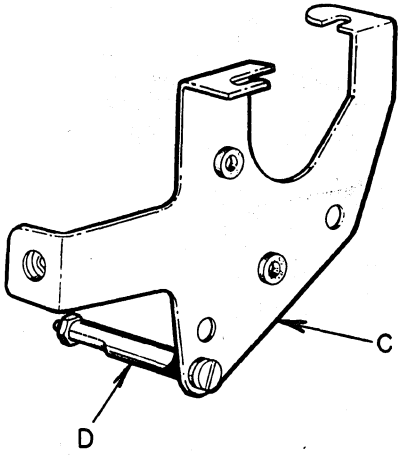

Fig. IV-20

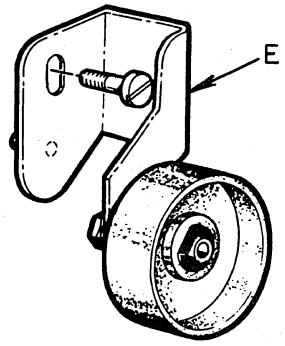

Fig. IV-21

3. Two left screws in typewriter keyboard support plate in front of the typewriter keyboard.
4. On mechanical keyboard machines, remove Shaft A and switch actuator B. On electrical keyboard machines, remove wires from shift interlock switch S-9. Remove wiring harness straps at left front of machine and move harness rearward.
5. Left rear case mounting bracket C and post D.
6. Rear idler pulley bracket E and magnetic clutch pulley F.

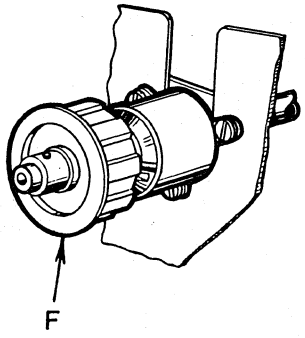

Fig. IV-22

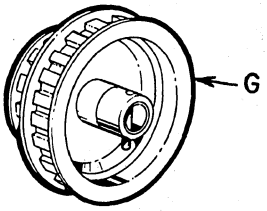

Fig. IV-23

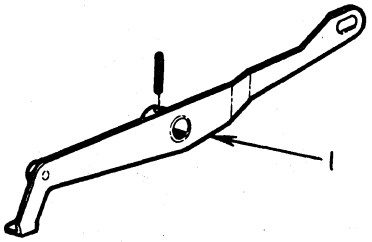

Fig. IV-25

7. Motor belt, main drive pulley G, main drive belt, arm H, ribbon lift arm I, interlock lever L, and clip K. Push shaft J slightly into the machine.
8. Loosen TM No. 1 and 2 and move rearward.

NOTE: On some early machines TM No. 1 and 2 are not fastened together. Be careful to keep pin connections in place.

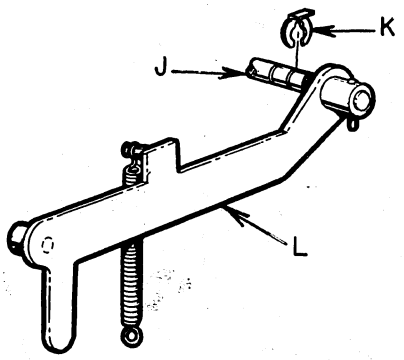

Fig. IV-26

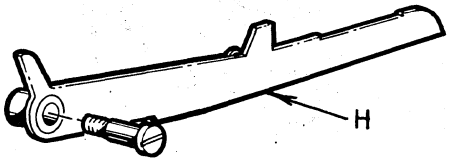

Fig. IV-24

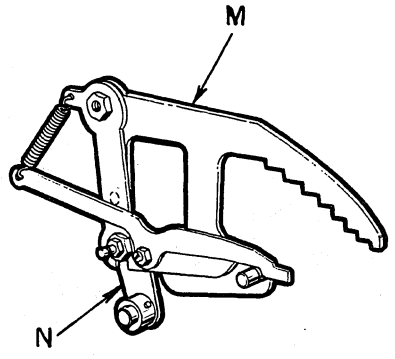

Fig. IV-27

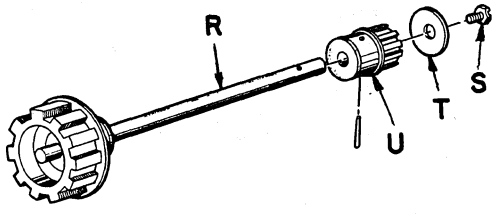

Fig. IV-29

9a. (F1300 and F1500) Register overthrow limit assembly M and pinned driving lever N.

9b. (F1200 and F1400) Link Q, assembly P and spring O.

10. Screw S, washer T, and pulley U from right end of open and close shaft R and slide shaft R out of machine.

11. Remove clip W, gear V and camshaft degree indicator X.
Use a rubber band to hold register hammer indexor upward clear of roll on register hammer assembly.

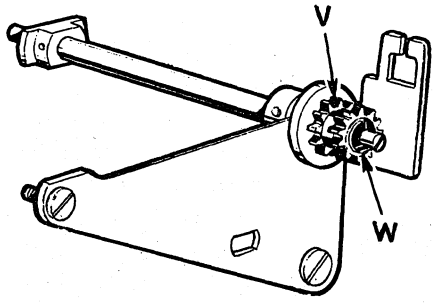

Fig. IV-30

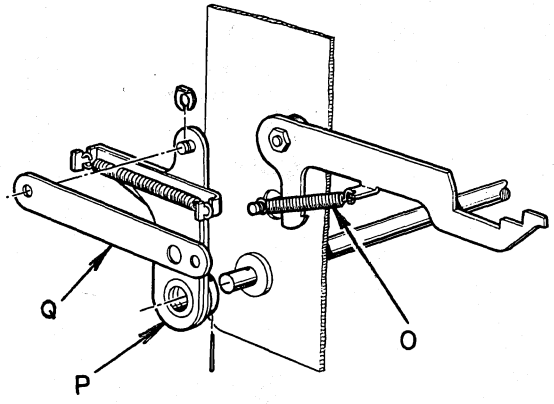

Fig. IV-28

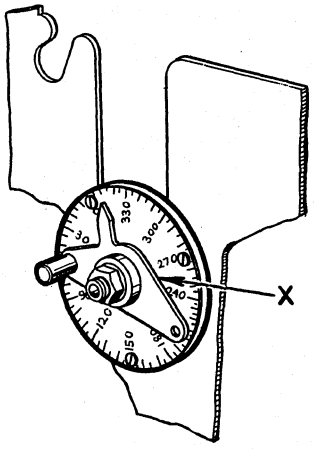

Fig. IV-31

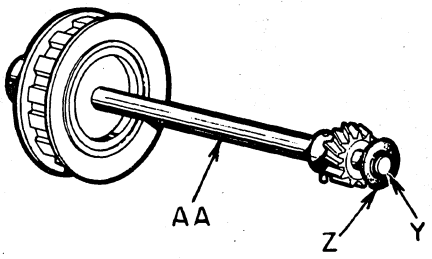

Fig. IV-32

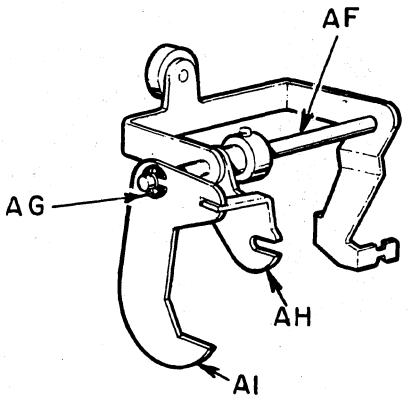

Fig. IV-34

12. Clip Y, thrust washer Z. Slide auxiliary drive shaft to left.
13. Clip AD and slide link AE off shaft AC.
14. Clip AG, move shaft AF inward and remove parts AH and AI.
15. Tie six code links AK with rubber band, disconnect at upper end and lower just far enough to permit bellcranks AJ to clear guide stud AL.

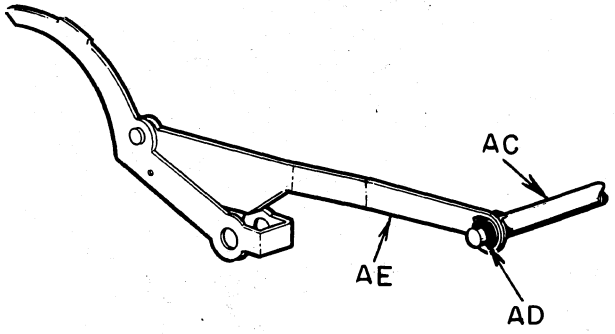

Fig. IV-33

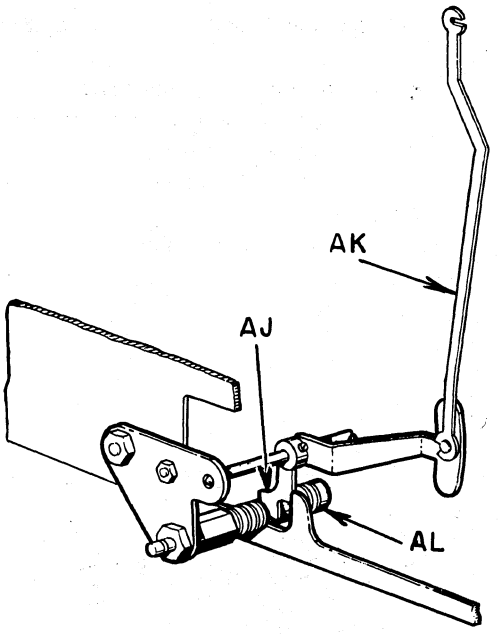

Fig. IV-35

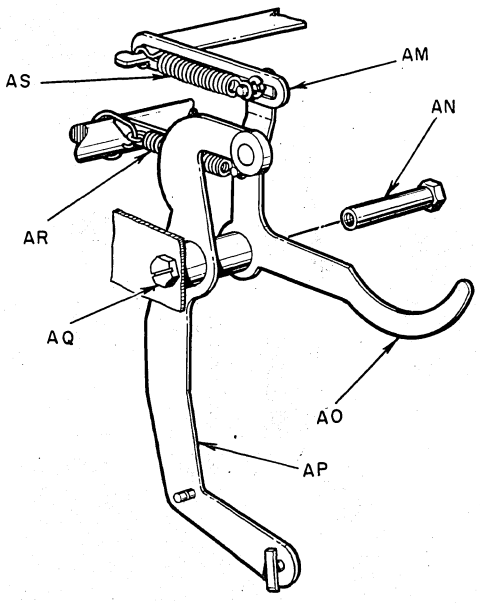

Fig. IV-36

16. Unhook springs AS and AR, remove link AM and screw AQ, slide shoulder nut AN and escapement drive lever AO to the right and remove, leaving lever AP connected.
17. Mark outline of bracket AB on side frame, remove screws AT and clip AY, and rotate bracket AB into cut out in side frame.
18. Left braces AU and AV, screw AX, and register designation bail AW.

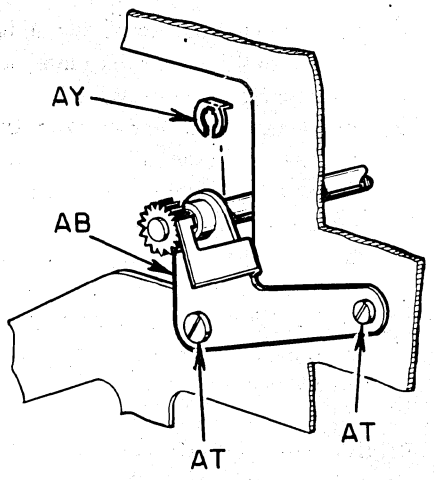

Fig. IV-37

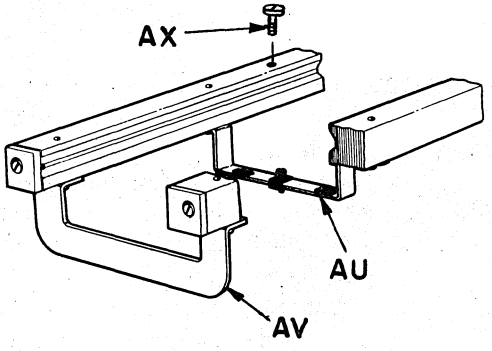

Fig. IV-38

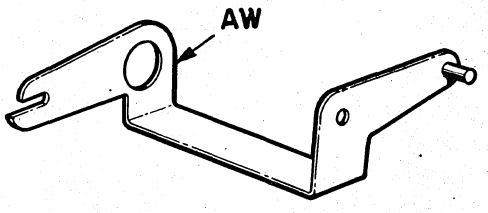

Fig. IV-39

✓Changes or additions since last issue.

19. Seven mounting screws, two in base, two in sensing unit back plate, and three in separator posts.
20. Screw from right end of nylon limit post for code actuator slides. Trip the typewriter drive, cycle 15 degrees to release spring tension and move left auxiliary side frame outward being careful to check for interference. The typewriter camshaft can be rotated manually to clear the follower arms of the power transfer shaft.

B. Replace parts in reverse order being careful to avoid interference of the parts listed below:
1. Sector lock linkage, part AE, Figure 33.
2. Register hammer indexing assembly.
3. Bellcranks AJ on lower ends of code links AK, Figure 35.
4. Post AZ, Figure 40.

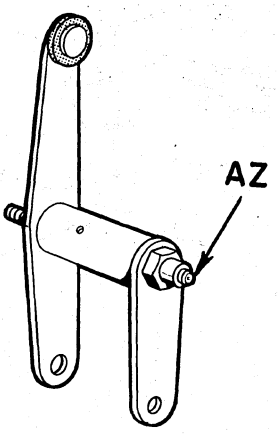

Fig. IV-40

SELENIUM RECTIFIER

A. Replacement.
1. Replace defective selenium rectifier on F1000 power packs prior to F110353P with a stack pole rectifier (no change in part number).
2. Mount the silicon rectifier A as shown, in the center hole nearest the capacitor using the washer and nut provided on the post.
3. The color coding is the same as on the selenium rectifier, connect harness wires to same color terminals as before.

AC Green

DC - Black

DC + Red

AC Green

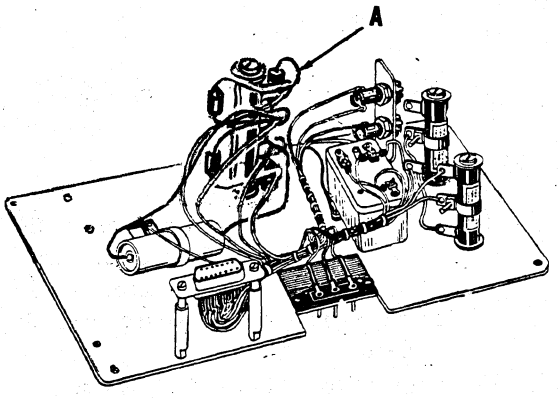

Fig. IV-41

Burroughs

SERIES F 1000

TYPING SENSIMATIC ACCOUNTING MACHINE

INSTRUCTION BOOK

Section V

●

CORRECTION BOOK

Printed in U. S. America—6-1-61

For Form 3741